LOWER LLAGAS CREEK
WATERSHED PROJECT
ENGINEERING APPENDIX

TC
425
L52.L6
1981
REF

TC425L52L61981c.2

LOWER LLAGAS

LEGEND

- ▭ EXCAV. EARTH CHANNEL
- ▨ Levee Construction
- ▩ WIDEN ONE BANK TO PREVENT INDUCED FLOODING
- ░ CHANNEL CLEARING
- ▓ RECT. CONC. CHANNEL
- ▥ LOW FLOW CHANNEL
- ▮▮▮ DELETED FROM PLAN

FIGURE 2
CHANNEL SCHEMATIC
LLAGAS CREEK WATERSHED PROJECT
SANTA CLARA COUNTY, CALIFORNIA

TABLE 1. (Revised) - ESTIMATED PROJECT INSTALLATION COSTS
Lower Llagas Creek Watershed, California

			ESTIMATED COST (Dollars)[1]		
Installation Cost Item	Unit	Number	PL-566 Fund	Other Fund	Total
LAND TREATMENT					
Soil Conservation Service					
Cropland	Ac.	5,370	-	180,000	180,000
Pasture and Hayland	Ac.	550	-	25,000	25,000
Rangeland	Ac.	1,440	-	15,000	15,000
Miscellaneous			-	5,000	5,000
Technical Assistance			15,000	20,000	35,000
TOTAL LAND TREATMENT			15,000	245,000	260,000[2]
STRUCTURAL MEASURES					
Construction					
Channel Work: N[3]	Mi.	3.3	3,662,000	0	3,662,000
M	Mi.	9.7	7,770,000	0	7,770,000
0	Mi.	2.7	1,183,000	0	1,183,000
Subtotal Construction			12,615,000	0	12,615,000
Installation Services					
Engineering			1,918,000	0	1,918,000
Other			640,000	0	640,000
Subtotal Installation Services			2,558,000	0	2,558,000
Other Costs					
Land Rights			0	6,692,000	6,692,000
Relocation Payments			0	0	0
Relocation Assistance Advisory Services			0	0	0
Subtotal Other Cost			0	6,692,000	6,692,000
TOTAL STRUCTURAL MEASURES			15,189,000	6,692,000	21,881,000
TOTAL PROJECT			15,204,000	6,937,000	22,141,000

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[1] Price Base 1980 or actual cost

[2] Completed

[3] Type of existing channel: N = An unmodified, well-defined natural channel; M = Man-made ditch or previously modified channel; 0 = None or practically no defined channel

TABLE 2. (Revised) - ESTIMATED COST DISTRIBUTION
Lower Llagas Creek Watershed, California
(Dollars)[1]

Item Channel Work		Reach	INSTALLATION COST - PL-566 FUNDS					INSTALLATION COST - OTHER FUNDS				
			Construction	Installation Engineering	Services Other	Relocation Payments	Total PL-566	Land Rights	Other Costs	Relocation Payments	Total Other	Total Installation Cost
LLAGAS CREEK												
0+00 to 64+00	M[2]	1	635,000	118,000	38,000	-0-	791,000	355,000	71,000	-0-	426,000	1,217,000[3]
64+00 to 127+00	M	2	3,268,000	490,000	163,000	-0-	3,921,000	506,000	59,000	-0-	565,000	4,486,200
127+00 to 182+00	N		2,723,000	409,000	137,000	-0-	3,269,000	443,000	32,000	-0-	495,000	3,764,000
182+00 to 379+00	M	3	3,071,000	461,000	154,000	-0-	3,686,000	901,000	103,000	-0-	1,004,000	4,690,000
379+00 to 458+00	N	4	282,000	42,000	14,000	-0-	338,000	17,000	-	-0-	17,000	355,000
WEST BRANCH LLAGAS CREEK												
0+00 to 169+00	M	9	722,000	108,000	37,000	-0-	867,000	1,409,000	217,000	-0-	1,626,000	2,493,000
169+00 to 182+00	O	10	216,000	320,000	11,000	-0-	259,000	467,000	88,000	-0-	555,000	814,000
182+00 to 220+00	N	11	619,000	93,000	31,000	-0-	743,000	514,000	80,000	-0-	594,000	1,337,000
LIONS CREEK												
182+00 to 195+00	O	10	216,000	33,000	11,000	-0-	260,000	467,000	87,000	-0-	554,000	814,000
195+00 to 281+00	O	12	615,000	92,000	31,000	-0-	738,000	374,000	64,000	-0-	438,000	1,176,000
281+00 to 285+00	N		38,000	6,000	2,000	-0-	46,000	23,000	4,000	-0-	27,000	73,000
MOREY CHANNEL												
211+00 to 227+00	O	13	68,000	10,000	4,000	-0-	82,000	100,000	17,000	-0-	177,000	199,000
227+00 to 245+00	M		90,000	14,000	4,000	-0-	108,000	134,000	23,000	-0-	157,000	256,000
NORTH MOREY CHANNEL												
217+00 to 233+00	O	13	68,000	10,000	3,000	-0-	81,000	100,000	17,000	-0-	117,000	198,000
TOTAL			12,631,000	1,918,000	640,000	-0-	15,189,000	5,810,000[4]	882,000	-0-	6,692,000	21,881,000

[1] Price Base 1980

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[2] Type of existing channel: N = An unmodified, well-defined natural channel; M = Man-made ditch or previously modified channel; O = None or practically no defined channel

[3] Part of this work was accomplished previous to this supplement.

[4] Includes $4,416,000 for bridge replacements and survey and legal fees.

TABLE 3 (revised)-STRUCTURE DATA

GRADE STABILIZATION STRUCTURES [1]
Lower Llagas Creek

Site	Drainage Area (sq. mi.)	Design Capacity (cfs)	Associated Frequency & Duration of Storm	Drop (ft.)	Vol of Concrete (cy)
Reach 2					
133 + 55 [2]	86.3	17800	100 yr. 24 hr.	5	1,400
148 + 95 [2]	86.3	17800	100 yr. 24 hr.	8	1,400
Reach 9					
0 + 00	17.8	6160	100 yr. 24 hr.	3.5	585
48 + 00	17.8	6160	100 yr. 24 hr.	3.8	585
110 + 75	13.1	4800	100 yr. 24 hr.	4	450
Reach 10					
182 + 00	4.1	2340	100 yr. 24 hr.	3	237
Reach 12					
220 + 00	2.1	950	100 yr. 24 hr.	2	174
268 + 00	2.1	850	100 yr. 24 hr.	5	174
Reach 11A					
182 + 00	6.9	2070	100 yr. 24 hr.	3.8	270
Reach 3					
196 + 00 [2]	66.0	8100	10 yr. 24 hr.	13.8	1,648
229 + 00 [2]	66.0	8100	10 yr. 24 hr.	4.0	824
379 + 00 [2]	61.8	7900	10 yr. 24 hr.	9.5	824

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[1] Concrete volumes and cost estimates are based on drop spillway structures.

[2] Structure includes fish ladder

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TABLE 3A. (Revised) - STRUCTURAL DATA - CHANNELS
Lower Llagas Creek Watershed, California

Reach	Channel	Drainage Area[1] sq. mi.	Design Discharge cfs	Channel Gradient ft/ft	Bottom Width ft.	Water Depth ft.	Side Slope	"N" Value Aged	"N" Value As Built	Velocities ft/sec Aged[2]	Velocities ft/sec As Built[3]	Excavation Volume cu. yds.	Type of Work[4]	Existing Channel Type[5]	Present Flow Condition[6]
LLAGAS CREEK															
1	0+00 to 30+00	89.5	10,000[7]	0.001	140	13 to 11	3:1 & 2:1	.030	.024	4.1 to 5.0[10]	6.9[11]	290,000[14]	II	Completed	I
	30+00 to 47+50	89.5	14,300[8]	0.001	140	13.9 to 12.9	3:1 & 2:1	.030	.024	5.4 to 5.9[10]	6.9[11]	[12]	II	Completed	I
	47+50 to 64+00	89.5	13,900[9]	0.001	110 to 121	14.2 to 13.7	2:1	.030	.024	7.1 to 6.8[10]	varies	[12]	II	Completed	I
2	64+00 to 93+40	89.5	18,800[16]	0.001	170	20.1	2:1[18]	.068	.025	4.44	7.14	928,617	II	M(1946)	I
	93+40 to 127+40	89.5	18,300[16]	0.001	170	19.9	2:1[18]	.069	.025	4.35	7.08	[12]	II	M(1946)	I
	127+40 to 182+00	86.3	17,800[16]	0.001	165	13.3	2:1[18]	.035	.025	6.80	7.03	[12]	II	N	E
3	182+00 to 190+80	82.5	8,100[7]	0.0008	100	12.0	2:1	.035	.035	5.46	5.46	13,870[14]	II	M(1971)	E
	190+80 to 294+00	64.7	8,100[7]	0.0016	100	9.8	2:1	.035	.035	6.88	6.88	[12]	II	M(1971)	E
	294+00 to 379+00	64.7	8,100[7]	0.0012	100	10.5	2:1	.035	.035	6.20	6.20	[12]	II	M(1971)	E
4	379+00 to 458+60	60.5	4,000[17]	Selective clearing and grubbing and low flow channel.								15,800	III	N	E
WEST BRANCH LITTLE LLAGAS															
9	0+00 to 55+00	17.8	6,160[16]	0.0009	50	13.8	2:1	.035	.035	5.75	4.86	0[15]	II	M(1971)	E
	55+00 to 169+00	15.0	4,800[16]	0.0013	50	11.0	2:1	.035	.035	6.12	5.14	[12]	II	M(1971)	E
10	169+00 to 182+00	11.0	4,800[16]	0.0013	50	11.0	2:1	.035	.025	6.12	6.47	95,238	I	0	
11a	182+00 to 220+00	6.9	2,340[16]	0.0013	60	6.7	2:1	.035	.025	4.75	4.86	116,764	II	N	E
LIONS CREEK															
10	182+00 to 195+00	4.1	1,840[16]	0.0012	40	7.4	2:1	.035	.025	4.61	4.83	See 10 above	I	0	
12	195+00 to 211+00	4.1	1,840[16]	0.0012	40	7.4	2:1	.035	.025	4.61	4.83	132,860	I	0	
	211+00 to 235+00	2.1	950[16]	0.0025	20	5.7	2:1	.035	.025	5.29	5.60	[12]	I	0	
	235+00 to 245+00	2.1	950[16]	0.0035	20	5.2	2:1	.035	.025	5.96	6.30	[12]	I	0	
	245+00 to 281+00	2.1	850[16]	0.0025	20	5.4	2:1	.035	.025	5.14	5.42	See above[12]	I	0	
	281+00 to 285+00	2.1	850[16]	0.0025	20	5.4	2:1	.035	.025	5.14	5.42	See above[12]	II	N	E
MOREY CHANNEL															
13	211+00 to 227+00	0.8	420[16]	0.0018	20	4.0	2:1	.035	.025	3.71	4.05	55,990	I	0	
	227+00 to 230+00	0.8	420[16]	0.0018	20	4.0	2:1	.035	.025	3.71	4.05	[12]	II	M(13)	E
	230+00 to 245+00	0.8	200[16]	0.0060	15	2.2	2:1	.035	.025	4.72	5.01	[12]	II	M(13)	E
NORTH MOREY CHANNEL															
	217+00 to 233+00	1.0	485[16]	0.0060	20	3.1	2:1	.035	.025	5.89	6.36	[12]	I	0	

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[1] Area tributary to Llagas Creek include Upper Llagas Creek Watershed

[2] Velocities associated with design discharge

[3] Velocities associated with 10-year frequency discharge

[4] Type of work: I = Establishment of new channel including necessary stabilization measures; II = Enlargement or realignment of existing channel or stream III = Cleaning out natural or man-made channel (includes bar removal and major clearing and snagging operation)

[5] Type of existing channel: N = An unmodified, well-defined natural channel; M = Man-made ditch or previously modified channel (approximate date of original construction shown in parenthesis); 0 = None or practically no defined channel

[6] I = Intermittent-continuous flow through some seasons of the year but little or no flow through other seasons; E = Ephemeral - flows only during periods of surface runoff, otherwise dry

[7] 10-year frequency discharge

[8] 25-year frequency discharge

[9] 50-year frequency dicharge

[10] Based on backwater from Pajaro River

[11] Based on normal depth

[12] Included in previous entry

[13] Date unknown (prior to 1920)

[14] Construction of pilot channel

[15] Levee on south side 9,300 cy

[16] 100-year frequency discharge

[17] Existing capacity plus capacity to preclude induced flowing from upstream work

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TABLE 4. (Revised) - ANNUAL COST
Lower Llagas Creek Watershed, California
(Dollars)[1]

Item	Amortization of Installation Cost	Operation and Maintenance Cost	Total
Structural Measures	741,300	40,100	781,400

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[1] Price Base 1980

[2] Amortized over 100 years at 3-1/4 percent

September 1981

6a

Table 5 (Revised) - ESTIMATED AVERAGE ANNUAL DAMAGE REDUCTION BENEFITS

Lower Llagas Creek Watershed, California

(Dollars)[1]

Item	Estimated Average Annual Damage [2]		Damage Reduction Benefits
	Without Project	With Project	
Floodwater & Sediment			
Agriculture	212,100	51,600	160,500
Commercial	443,900	600	443,300
Industrial	75,200	0	75,200
Residential	82,300	5,100	77,200
Other Urban	64,000	400	63,600
GRAND TOTAL	877,500	57,700	819,800 [3]

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[1] Price Base: Agriculture at Current Normalized Prices, all others at 1980 prices

[2] Damages from floods rarer than the 1 percent event were not evaluated

[3] Excludes the effects of accelerated land treatment measures

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Table 6 (Revised) - COMPARISON OF BENEFITS AND COSTS

Lower Llagas Creek Watershed, California

(Dollars)

Evaluation Unit	Average Annual Benefits 1/			Average Annual Cost 3/	Benefit Cost Ratio
	Damage 2/ Reduction	Savings in Future Costs	Total		
Upper Llagas	819,800	64,400	884,200	781,400	1.1:1.0

1/ Price Base: Agriculture at current normalized prices; all others at 1980 prices or actual cost on work completed

2/ From Table 5

3/ From Table 4

September 1981

~~6a~~
6c

Calif Lower Llagos
LLHansen 8/31/81
Summary of Kinds of Work by Reach

Reach	Length	Existing Channel	Kind of Work
1	1.2	M 1/	Complete
2	1.2	M 1/	Trap Channel
	1.0	N 2/	Trap Channel
3	3.7	M 1/	Stabilize + Mitigate
4	1.5	N 2/	Clear and Grub
9	3.2	M 1/	Trap Channel
10	.5	O 3/	Trap channel
11a	.7	N 2/	Trap channel
12	1.6	O 3/	Trap Channel
	.1	N 2/	Trap Channel
13	.6	O 3/	Trap Channel
	.4	M 1/	Trap Channel
	14.5		

1/	2/	3/
1.2	1.0	.5
1.2	1.5	1.6
3.7	.7	.6
3.2	.1	2.7
.4	3.3	
9.7		

~~6b~~ 6d

DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Calif
LLH 8/31/81
PROJECT Lower Llagas
CHECKED BY DATE

Summary of Construction Cost by Type of Existing Channel

Const Reach	Type of Exist Channel	Construction Cost 566 1/
1	M	635,000
2	M	3268,000
	N	2,723,000
3	M	3,071,000
4	N	282,000
9	M	722,000
10	O	432,000
11a	N	619,000
12	O	615,000
	N	38,000
13	O	136,000
	M	90,000
		12,631,000

1/

M	N	O
635,000	2,723,000	432,000
3268,000	282,000	615,000
3071,000	619,000	136,000
722,000	38,000	
90,000		
7,786,000 +	3,662,000 +	1,183,000 = 12,631,000

N

Lower Llagas Creek
Cost Summary

			PL 566										other				
			1	2	3	4	5	6	7	8		9	10	11	12		13
Reach	Cut	Fill	Concrete	Rock	Vegetation	Misc	Sub Total	Contengency 12%	Sub Total	Engr 15%	Adm 5%	Total 566	other Land Rights	R/W	Adm Engr Inspect 20%	Total other	Total Reach
1	18,488	12,919	0	0	5700	8199	49241	5909	635,150[1]	118273[2]	37,758[3]	791181	354,816	0	70,963	425,779	1,216,96
2	2600,128	0	980000	898199	62400	808762	5349489	641938	5991427	898714	299572	7189.713	555296	394380,[4]	111059	1,060735	8,25044
3	38,800	0	1146250	1517200	40000	0	2,742,250	329070	3,071,320	460698	153,566	3,685,584	516096	385,000	103219	1,004,315	4,689,89
4	136,170	0	0	100360	8064	7338	251932	30232	282,164	42325	14108	338597	0	16716	0	16716	3553
9	0	21,026	567,000	18960	1300	36105	644931	77327	722258	108339	36113	866710	1087,085	321500	217417	1,626,002	2,4927
10	266,666	0	82,950	0	0	36197	385813	46298	432,111	64817	21606	518,534	875,168	58,500	175,034	1,108702	1,627,23
11a	373,518	0	94,500	8200	0	76,089	552,307	66,277	618,584	92788	30,929	742,301	400,966	113,262	80,193	594421	1,336,72
12	322,008	0	121,800	13920	0	74,980	582,708	69925	652,633	97896	32,632	783,161	349,928	56000	68186	465114	1,248,27
13	156,976	0	0	0	0	45026	202,002	24,240	226,242	33936	11,312	271,490	285,936	48206	57,187	391,329	662,81
Total	3,962,754	38,945	2,992,500	2,556,839	117464	1092696	10,760,673	1,291213	12,631889[1]	1,917,786[2]	637,596[3]	15,187,271	4,416,291	1,393,564	883,258	4,693,113	21,880,38

1/ $580,000 Completed prior to this supplement
2/ $110,000 " " " " "
3/ $35,000 " " " " "
4/ previously purchase R/W

Calif Lower Llagas

L L Hansen 8/13/81

Summary of Cost Rounded

Reach	Const	Engr	Total	Land	Const	Engr	Total.	Total
1	635 000	156,000	791 000	0	355,000	71,000	426,000	1,217,000
2	5 991,000	1,199 000	7,190,000	394,000	555,000	112,000	1,061,000	8,251,000
3	3,071,000	615,000	3,686,000	385,000	516,000	103,000	1,004,000	4,690,000
4	282,000	56,000	338,000	17,000	—	—	17,000	355,000
9	722,000	144,000	866,000	322,000	1,087,000	217,000	1,626,000	2,492,000
10	432,000	87,000	519,000	59,000	875,000	175,000	1,109,000	1,628,000
11a	619,000	124,000	743,000	113,000	401,000	80,000	594,000	1,337,000
12	653,000	131,000	784,000	56,000	341,000	68,000	465,000	1,249,000
13	226,000	45,000	271,000	48,000	286,000	57,000	391,000	662,000
Total	12,631,000	2,557,000	15188,000	1,394,000	4,416,000	883,000	6,693,000	21,881,000

Calif
L L Hansen 7/31/81

Lower Llagas

Construction Reach	EIS	FONSI	WAD*
2	X		
3		X	X
4			X
9	X		
10	X		
11a	X		
12	X		
13	X		

*WAD = Work Already Done

Reach	Const.	Engr	Total	Land	Construction	Engr	Total	Project Total
1	0	0	0	0	354,816	70,963	425,779	425779
2	5,991,427	1,198,286	7,189,713	394,380	555296	111,059	1,060,735	8,250,448
9	705,336	141,914	847,250	321,500 1/	1,087,085	217,417	1,626,002	2,473,252
10	432,111	86,423	518,534	58,500	875,168	175,034	1,108,702	1,627,236
11a	618,584	123,717	742,301	113,262	400,966	80,193	594,421	1,336,722
12	652,633	130,528	783,161	56,000	340,928	68,186	465,114	1,248,275
13	226,242	45,248	271,490	48,206	285,936	57,187	351,329	662,819
Total	8,626,333	1,726,116	10,352,449	991,848	3,900,195	780,039	5,672,082	16,024,531
1 3/	580,000	145,000	725,000	—				725,000
WAD 2/ 3				385,000 1/	516,096	103,219	1,004,315	1,004,315
4L	282,164	56,433	338,597	16716	0	0	16,716	355,313
Total	862,164	201,433	1063597	401,716	516,096	103,219	1,021,031	2084628
FONSI 3	3,071,320	614,264	3685,584		—	—		3,685,584
1	55,150	11,031	66,181					66,181
9	16,922	2,538	19,460					19,460
Total	3143392	627,838	3771,225					3,771,225
Total	12,631,869	2,555,387	15,187,271	1,393,564	4,416,291	883258	6,693,113	21,880,384

Calif

Ritterson 8/31/88

Lower Llagas

Cost by Construction distributed

1/ previous purchased R/W

2/ Work already Done

3/ Work completed prior to this supplement

Calif

Lower Llagas

L.L. Hansen 8/31/81

Cost by Construction Reach Distributed

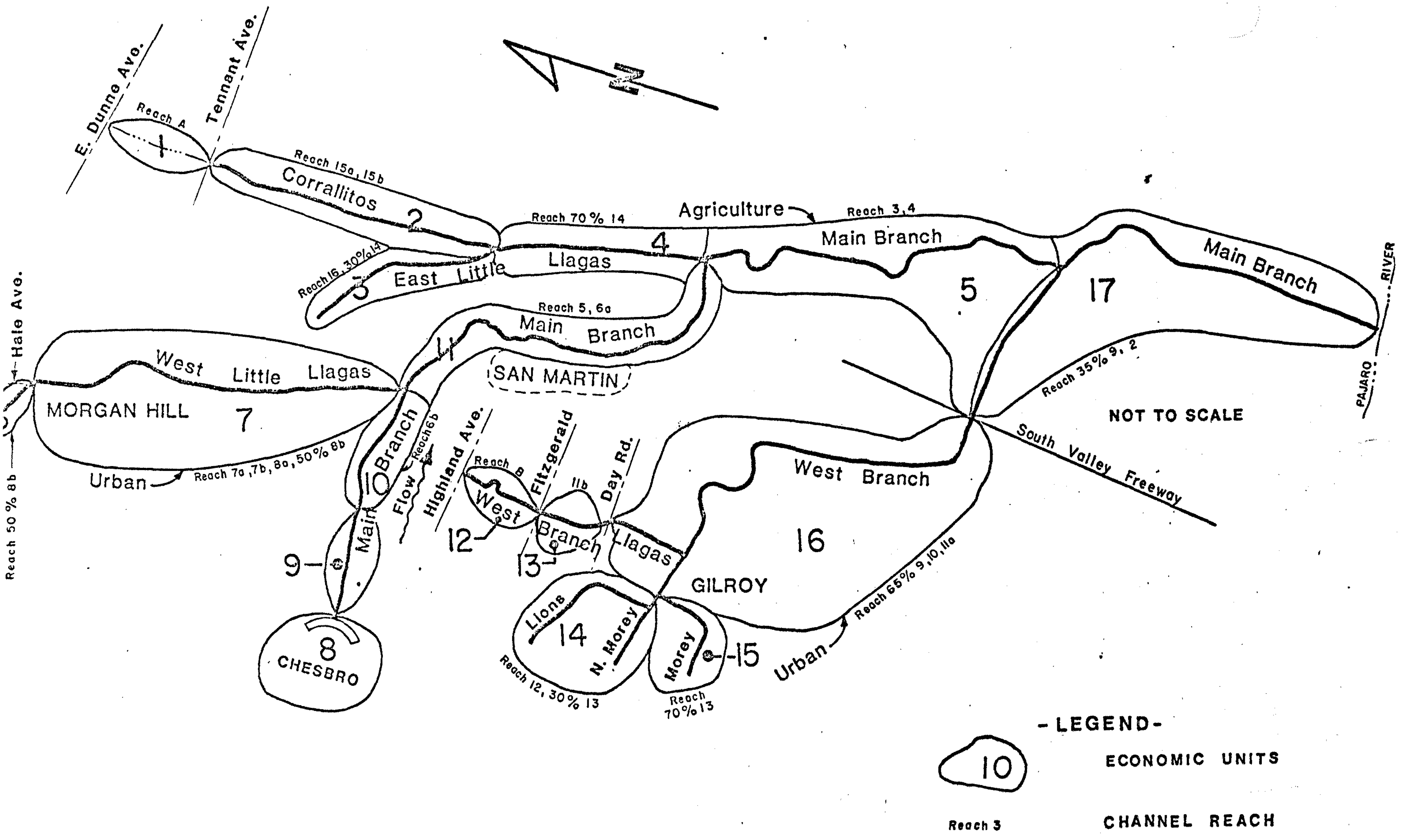
Reach	Const	Engr	Total	Land	Const	Engr	Total	Project Total
1	0	0	0	0	354,800	71,800	425,800	425,800
2	5,991,400	1,198,300	7,189,700	394,400	555,300	111,000	1,060,700	8,250,400
9	705,300	141,900	847,200	321500 [1]	1,087,100	217,400	1,626,000	2473,200
10	432,100	86,400	518,500	58,500	875,200	175,000	1,108,700	1,627,200
11a	618,600	123,700	742,300	113,300	401,000	80,200	594,500	1,336.800
12	652,600	130,500	783,200	56,000	340,900	68,200	465,100	1,248,300
13	226,200	45,200	271,400	48,200	285,900	57,200	391,300	662,700
Total	8,626,200	1,726,100	10,352,300	991,900	3,900,200	780,000	5,672,100	16,024,900
Fonsi 6	55,200	11,000	66,200					66,200
9	16,900	2,500	19,400					19,400
3	3,671,300	614,300	3,685,600	—	—	—	—	3,685,600
	3,743,400	627,800	3,771,200					3,771,200
WAD [3] 7	580,000 [2]	145,000 [2]	725,000 [2]	0	0	0	0	725,000
3	0	0	0	385,000	516100	103,200	1,004,300	1,004,300
4L	282,200	56,400	338,600	16,700	0	0	16,700	355,300
Total	862,200	201,400	1063600	401,700	516,100	103,200	1,021,000	2,084,600
Project Total	12,631,800	2,555,300	15,187,100	1,393,600	4,416,300	883,200	6,693,100	21,880,200

[1] previously purchased R/W

[2] Work completed prior to supplement

[3] WAD = Work already done

11



ECONOMIC EVALUATION UNITS

ATTACHMENT 1

Calif   Lower Llagos
LLH   8/31/81

Channel Nomenclature Conversion

Reaches

Construction		Economic
1		17
2		17
3		5
4		5
9	(35%)	17
9	(65%)	16
10		16
11a		16
12		14
13	(30%)	14
13	(70%)	15

Calif
LLH 8/31/81
Channel lengths

Lower Llagas

Construction Reach #		Eonomic Reach#	Length Miles	℄ Length Miles
1		17	1.2	4.5
2		17	2.2	
3		5	3.7	5.2
4		5	1.5	
9	(35%)	17	1.1	
9	(65%)	16	2.1	3.3
10		16	.5	
11a		16	.7	
12		14	1.7	1.7
13	(30%)	14	.3	1.0
13	(70%)	15	.7	
			15.7 miles	15.7 miles

Calif

Lower Llagas

LLH 8/31/81

Channel Lengths by Type of Work

Const. Reach	Econ Reach	Length	Type of Work	Summary of Length
1/ 1	17	1.2	WAD	4.9
2	17	2.2	EIS	10.8
3	5	3.7	WAD	
2/ 4	5	1.5	EIS	
9 (35%)	17	1.1	EIS	
9 (65%)	16	2.1	EIS	
10	16	.5	EIS	
11a	16	.7	EIS	
12	14	1.7	EIS	
13 (30%)	14	.3	EIS	
13 (70%)	15	.7	EIS	
		15.7 miles		15.7 miles

1/ only included in supplement documentation - not included in Draft Environmental Impact Statement

2/ work is ~~charged~~ discribed ~~to~~ in EIS but cost is charged to ~~Work Already Done (WAD)~~ ~~FONZI~~ Benifits Already Gotten

Calif
LLH

8/11/81
Cost Summary By Econ Reach
for EIS Only

Lower Llagas

Reach	Const	Engr	Total	Land	Const	Engr	Total	Project Total
14	720,500	144,200	864,700	70 500	426,700	85400	582,600	1,447,300
15	158,300	31,600	189,900	33,700	200,100	40,000	273,800	463,700
16	1,509,100	302,300	1,811,400	380,800	1,982,800	396,500	2 760,100	4,571,500
17	6,238,300	1,248,000	7,486,300	506,900	1,290,600	258,100	2,055,600	9,541,900
Total	8,626,200	1,726,100	10,352,300	991,900	3,900,200	780,000	5,672,100	16,024,400
WAD								
1/ 5	282,200	56,400	338,600	401 700	516,100	103,200	1,021,000	1,359,600
2/ 17	580,000	145,000	725,000	0	0	0	0	725,000
Total	862,200	201,400	1,063,600	401,700	516,100	103,200	1,021,000	2,084,600
Fonsi								
3/ 5	3,071,300	614,300	3,685,600	0	0	0	0	3,685,600
16	11,000	1,600	12,600	0	0	0	0	12,600
17	61,100	11,900	73 000	0	0	0	0	73,000
Total	3,143,400	627,800	3,771,200	0	0	0	0	3,771,200
Proj Total	12,631,800	2,555,300	15,187,100	1,393,600	4416,300	833,200	6693100	21,880200

1/ Work is in construction reach 4 (Lower Llagas) and bridges in Construction reach 3
2/ Work is in construction reach 1
3/ Work is in construction reach 3

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

15a

Calif

PROJECT Lower Llagas

LL Hansen 8/25/81

Spoil Disposal

Spoil from channel excavation is assumed to be disposed of on lands already in public ownership or on lands dedicated to the county at no cost. Refer to spoil disposal site investigation report of July 1976.

Calif
LLHansen 8/14/81
OM&R

Lower Llagas

OM&R has been estimated by SCVWD at $2600 per mile see Cost Summary Data

Cost = 15.7 miles @ $2600/mi = $40820

LLAGAS CREEK WATERSHED PROJECT

BRIDGES

(34)

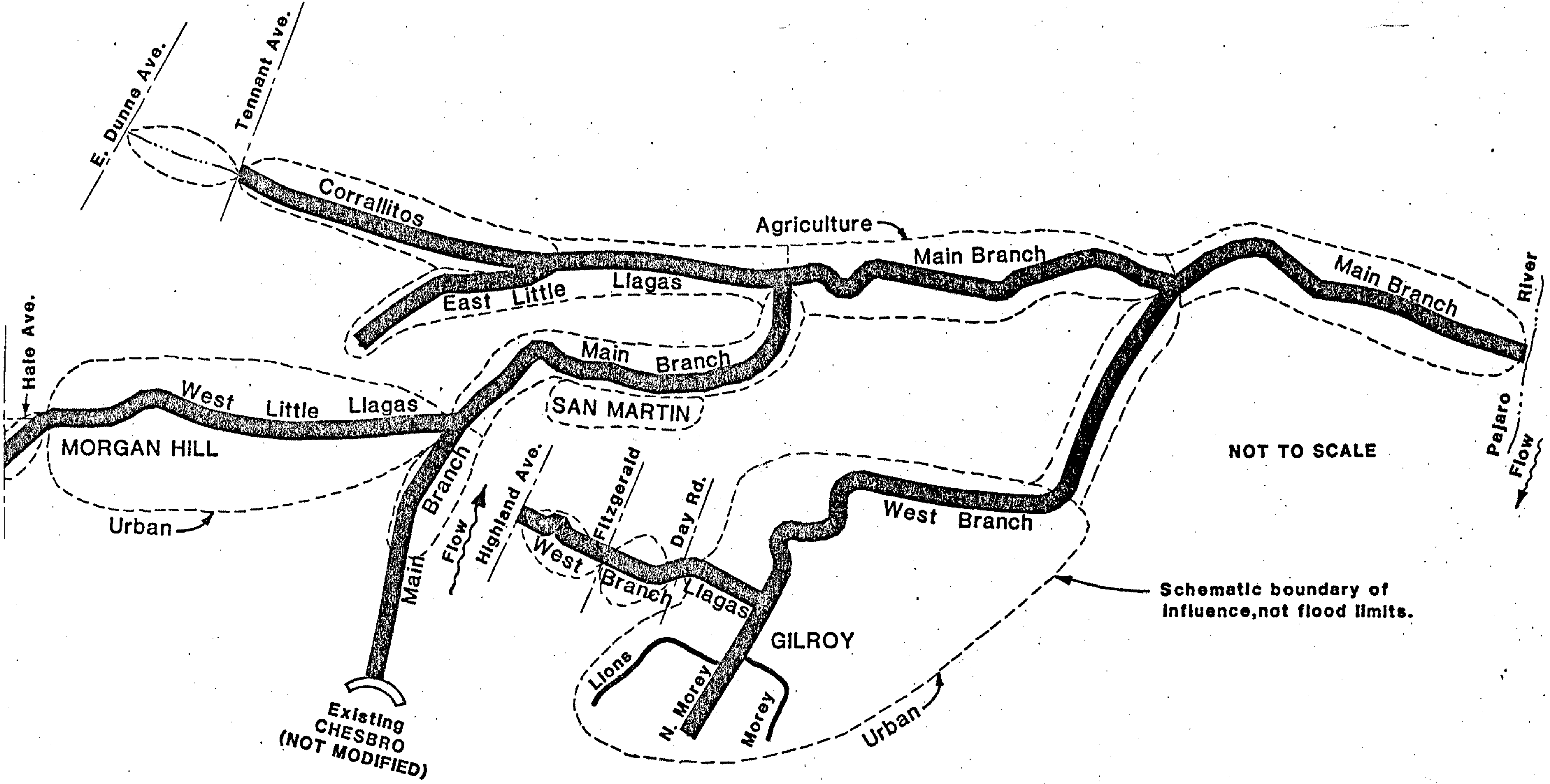
BRIDGES				EXISTING		PROPOSED		
JURISDICTION	REACH NO.	STATION	TYPE OWNERSHIP	ROADWAY WIDTH	WATER OPENING	ROADWAY WIDTH	WATER OPENING (SPAN)	REMARKS (BRIDGE OR BOX)
COUNTY	1	50+40	STATE	60'	50'	Bloomfield Rd	220	BRIDGE
GILROY	2	127+40	CITY	13'	72'	Sewer Ponds	260'	BRIDGE
		162+00	STATE(152)	32.5'	89.5'	Pachaco Pass	260'	BRIDGE
COUNTY	3	238+00	COUNTY (GILMAN RD.)	22'	59'		154'	BRIDGE
		294+00	COUNTY (LEAVESLEY RD)	31'	48.5'		166'	BRIDGE
MORGAN HILL	new 7A	30+70	COUNTY (W. MIDDLE AVE)	19'	NO STRUCTURE		TRIP 12X9	RCB
		69+30	COUNTY (WATSONVILLE RD)	25'	NO STRUCTURE		TRIP 12X9	RCB
		80+50	CITY (LaCrosse)				TRIP 12x9	RCB
		88+50	CITY	49.5'	24'		74'	BRIDGE
		96+40	CITY (W.EDMONDSON)	22'	12'		TRIP 10X9	RCB
		102+60	PRIVATE				67'	BRIDGE
		104+40	PRIVATE	42'	ELIP 84X54		67'	BRIDGE
new →		111+10	PRIVATE	9'	13'		67'	BRIDGE
MORGAN HILL	7B	116+30	CITY (COSMO AVE)	24'	2-54" CMP		DOUBLE 10X8	RCB
		130+20	CITY (SPRING AVE)	40'	8'		DOUBLE 10X8	RCB
		144+00	CITY (W.DUNNE AVE)	WEST SIDE 55.5' EAST SIDE 67.5'	8.5'		DOUBLE 8X8	RCB
MORGAN HILL	8A	148+50	CITY (W. FIFTH ST.)	40'	7'		DOUBLE 14X8	RCB
		151+20	CITY (FOURTH ST.)	39'	16'		SIN 12X8	RCB (180 Linear Feet)
		156+13	CITY (W. THIRD ST.)	WEST SIDE 22' EAST SIDE 60'	9'		SIN 12X8	RCB
		161+12	2a CITY (DEL MONTE AV.)	40'	7'		SIN 12X8 SIN 2X81/4	RCB RCB
		164+84	CITY (WARREN AVE.)	18'	8'		SIN 12X8	RCB
		173+94	CITY (W. MAIN ST.)	45.7'	9.4'		SIN 12X8	RCB
		195+15	CITY (WRIGHT and HALE)		9.2' RCB & 2-30" CMP		SIN 12X8	RCB
GILROY	9	115+00	COUNTY (LEAVESLEY RD)	WEST SIDE 121' EAST SIDE 130.5'	10'		TRIP 12X9 SIN 10X9	RCB
		147+00	COUNTY (MURRAY AVE)	OLD 20.5'	5'		120'	BRIDGE
		169+00	RAILROAD (MONTEREY RD.)		5'		112'	BRIDGE
GILROY	10	170+00	STATE (MONTEREY RD.)	71'	NO STRUCTURE		112'	BRIDGE
		192+00	COUNTY (WREN AVE.)	22'	NO STRUCTURE		94'	BRIDGE
GILROY	11A	193+00	COUNTY (FARRELL)	20'	16'		102'	BRIDGE
		220+00	COUNTY (DAY RD.)	21'	16'		96'	BRIDGE
ROY	12	206+00	COUNTY (KERN AVE)	20'	NO STRUCTURE		90'	BRIDGE
		250+00	COUNTY (MOREY AVE)	21'	24"		74'	BRIDGE
GILROY	13	233+50	COUNTY (MOREY AVE)	20'	48"		66'	BRIDGE
		245+00	COUNTY (MOREY AVE)	20'	7.5'		61'	BRIDGE

LLAGAS CREEK WA SHED PROJECT
LEVELS OF PROTECTION

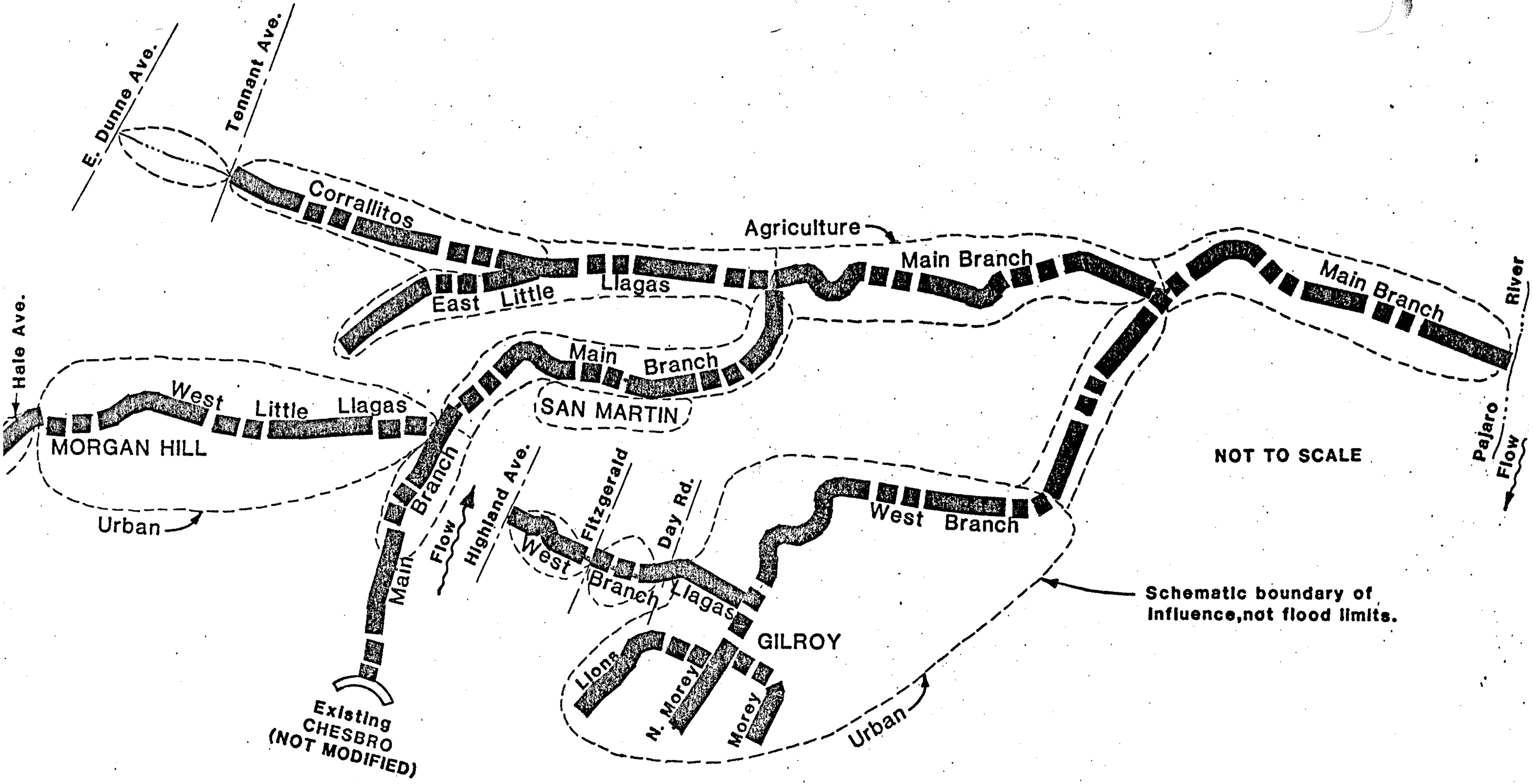
LEGEND

▬	Detailed Damage Analysis-Present Land Use
▬ ▬ ▬	Detailed Damage Analysis-Future Land Use

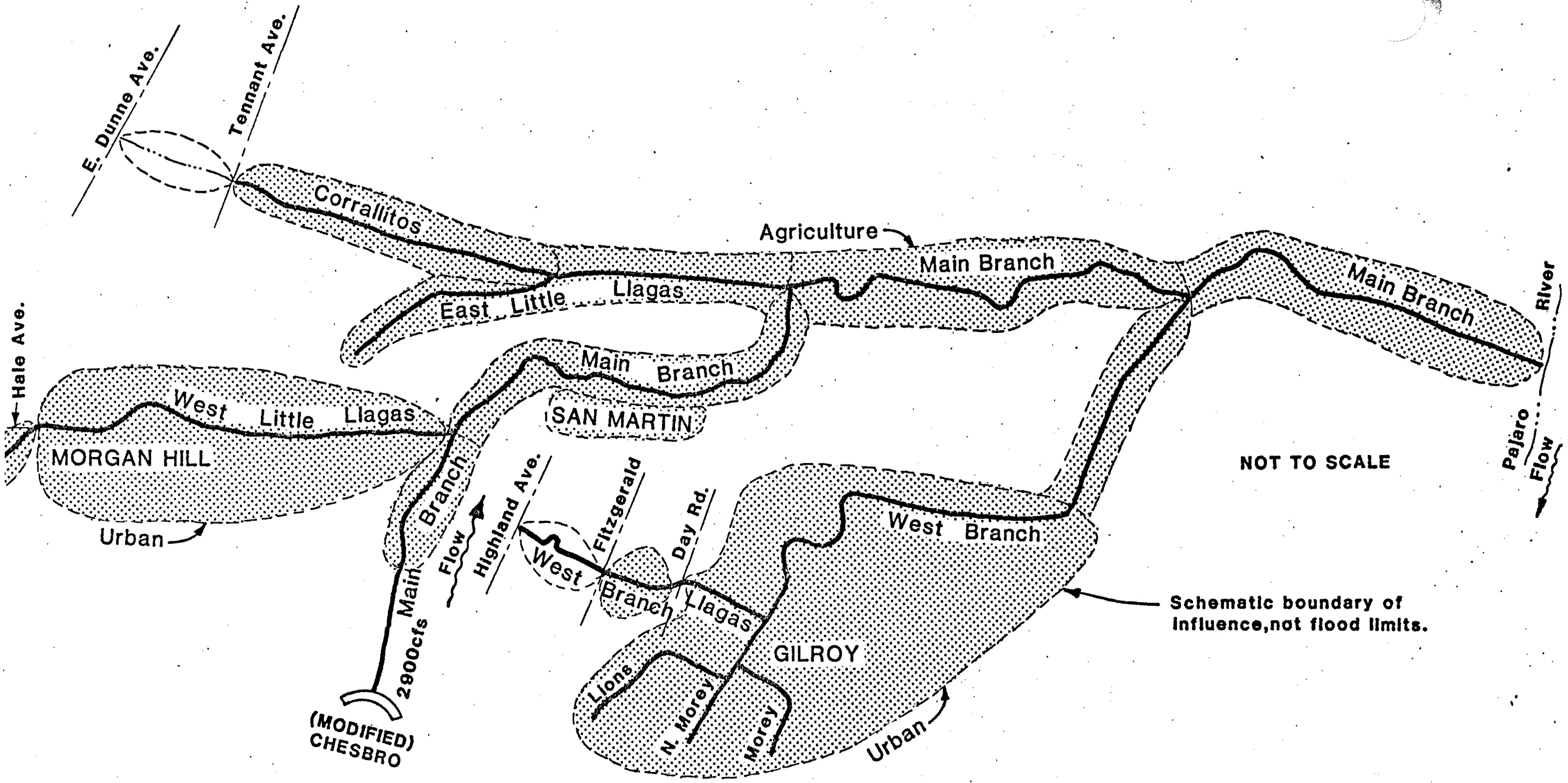
	COST		BENEFITS
░	1% Channel	-	1% Damage Prevented
▩	10% Channel	-	10% Damage Prevented
▨	10% Channel	-	X% Damage Prevented Downstream of a 1% Channel.
▒	1% Channel for Modified Operation of Chesbro (Existing Work Plan Design)	-	Less Than 1% Damages Prevented Because of Extra 1000cfs Due to not Modifying Operation of Chesbro
▧	No Induced Downstream Flooding. Upgrade the Existing Channel Just Enough to Take Extra Flow Caused by Eliminating the 1% Flood Storage in Urban Areas.	-	No Damage Prevented. Also, no Damage Induced.



Detailed Damage Analysis-Present Land Use

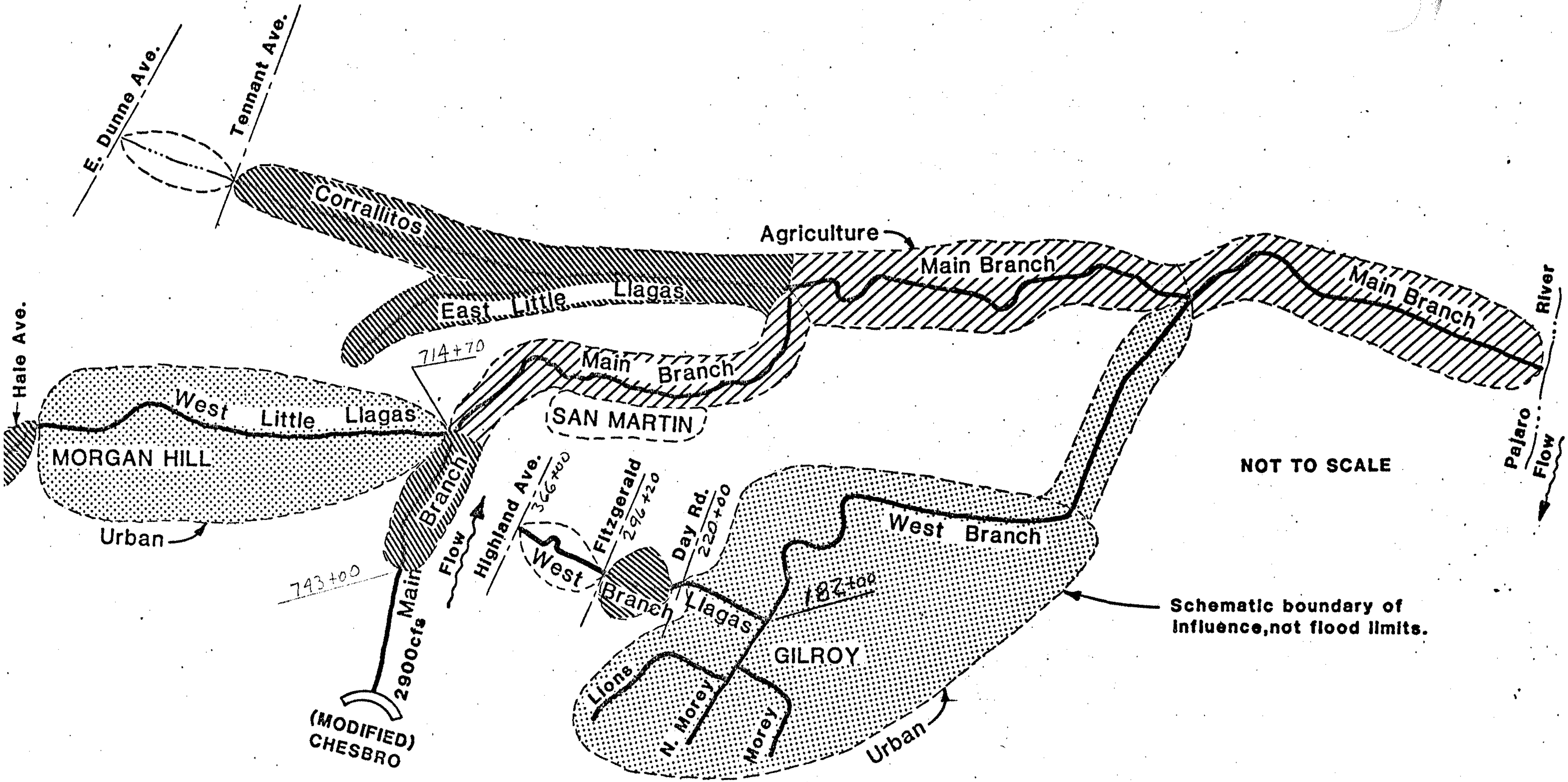


Detailed Damage Analysis-Future Land Use



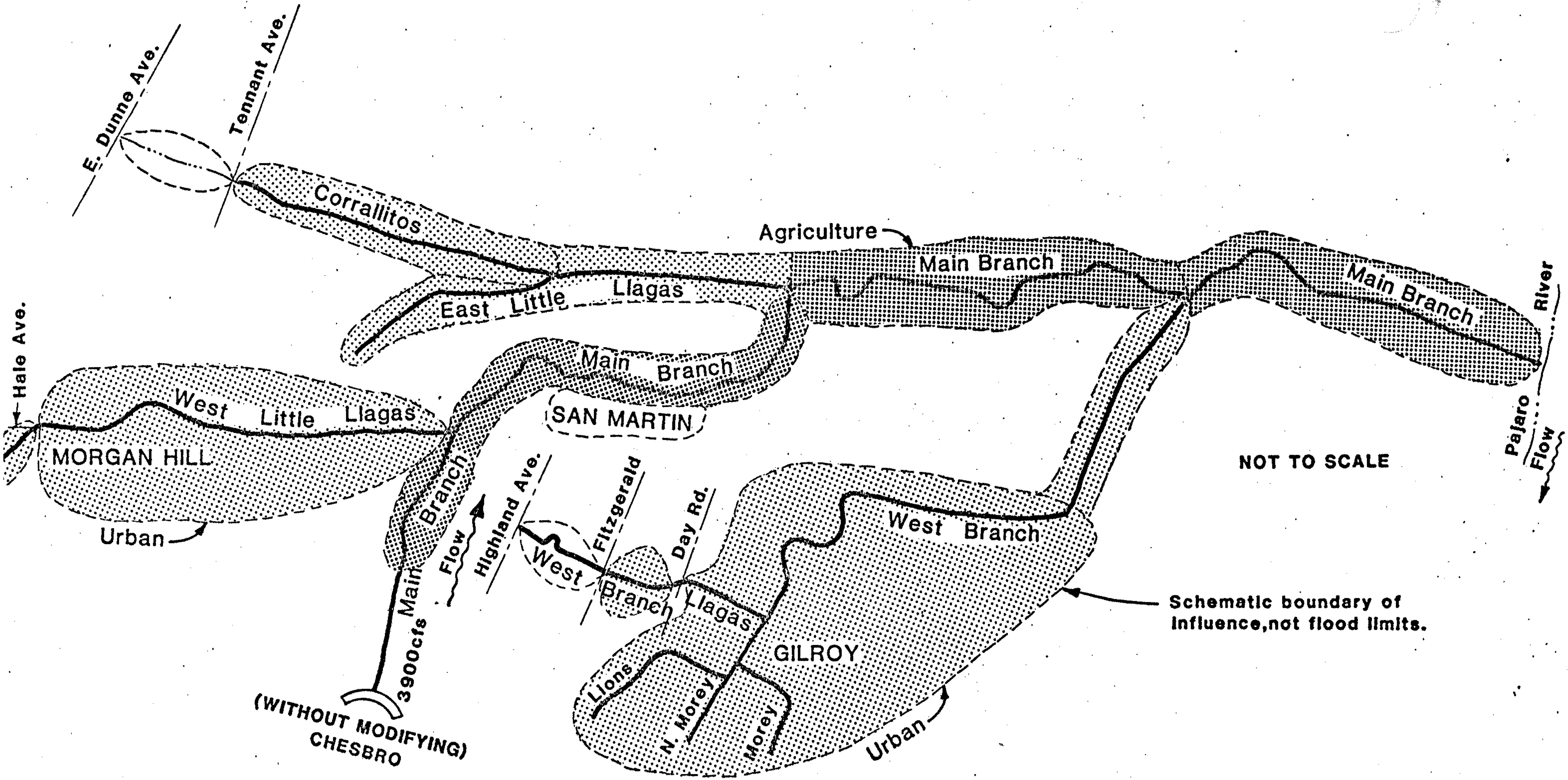
CASE 1

1% Protection Throughout (Original Project Limits Shown on SCS's "Work Plan")



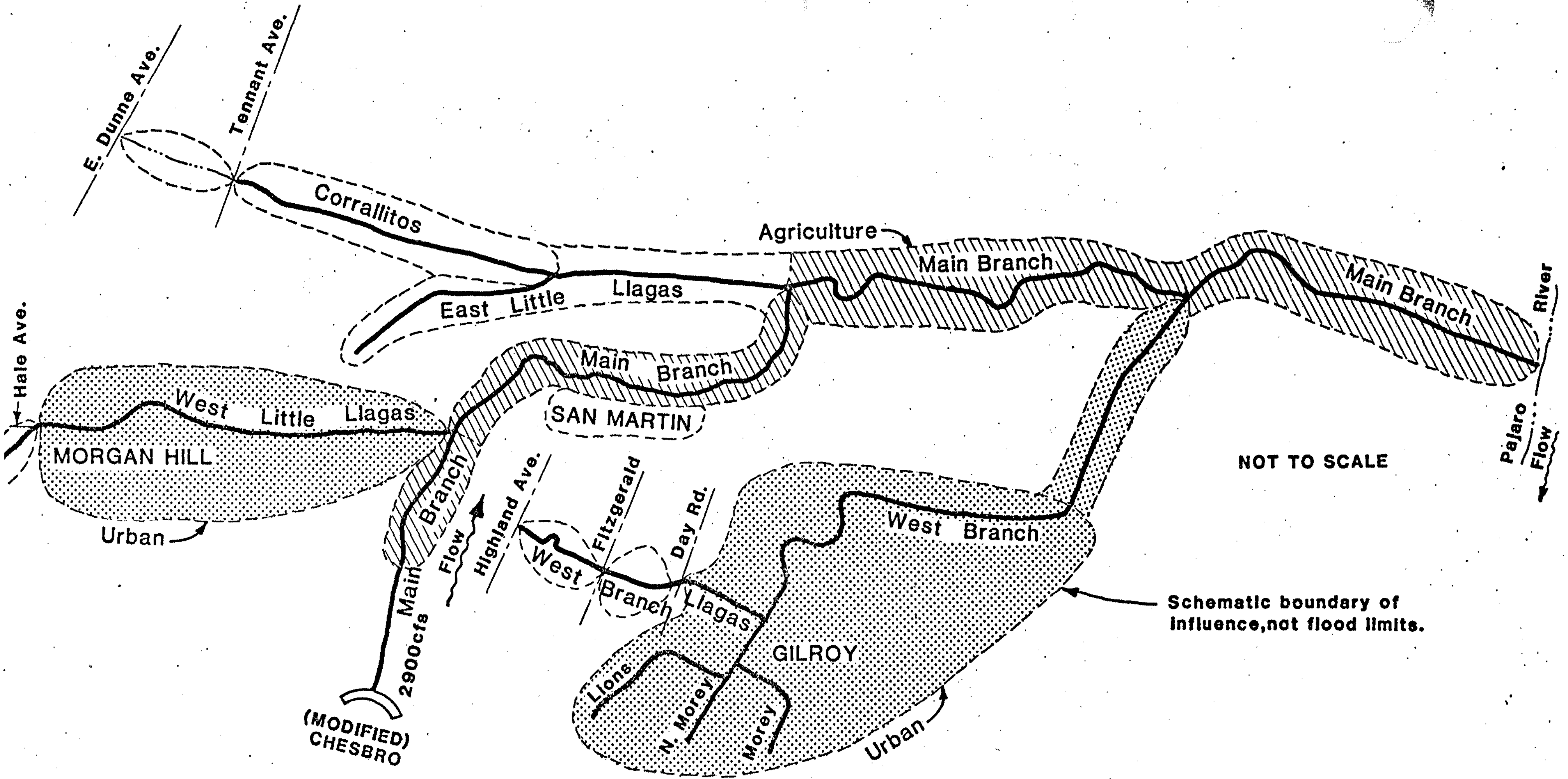
CASE 2

1% Urban-10% Agriculture



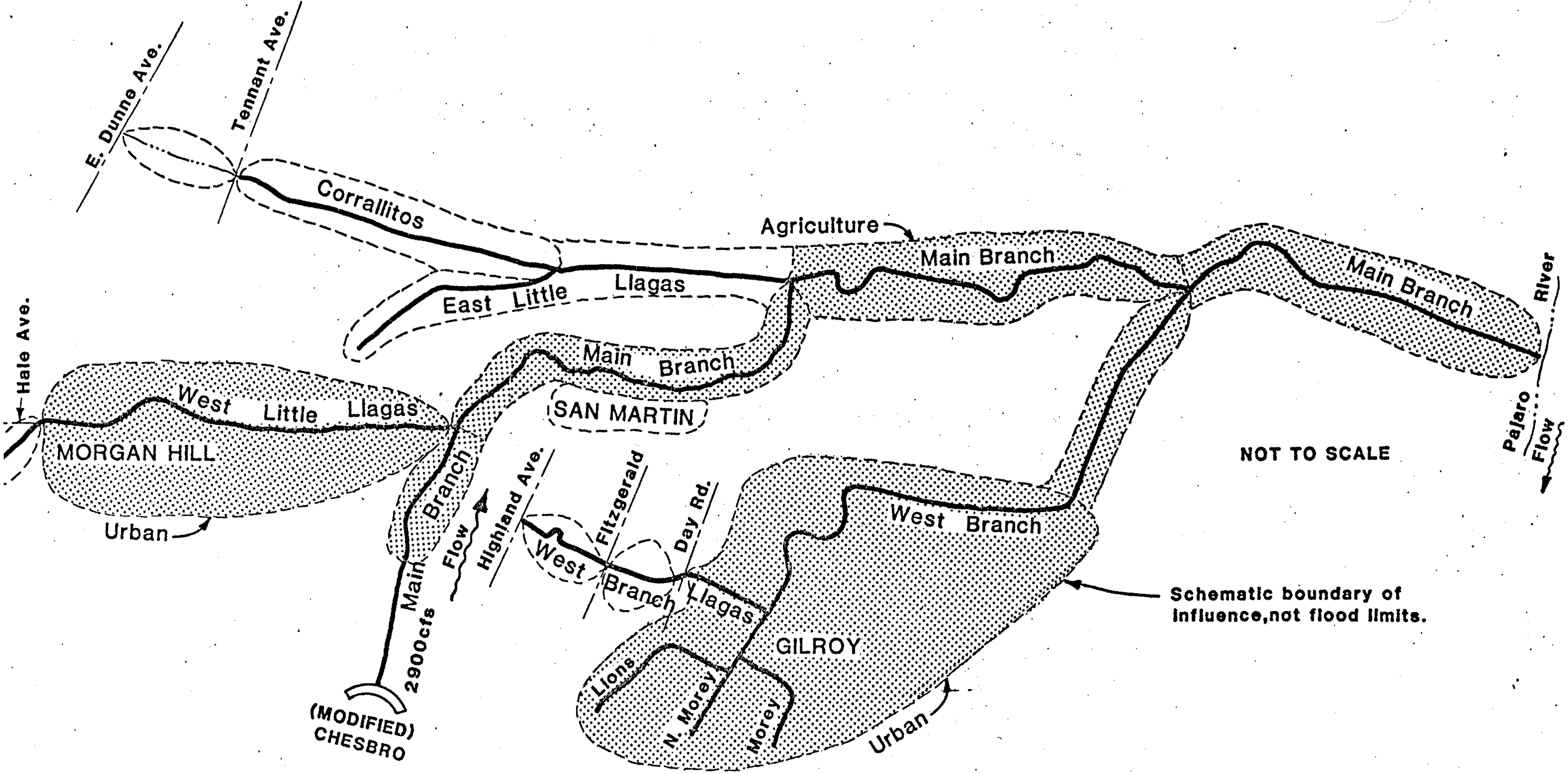
CASE 3

Present Channel Design but Without Modifying the Operation of Chesbro



CASE 4

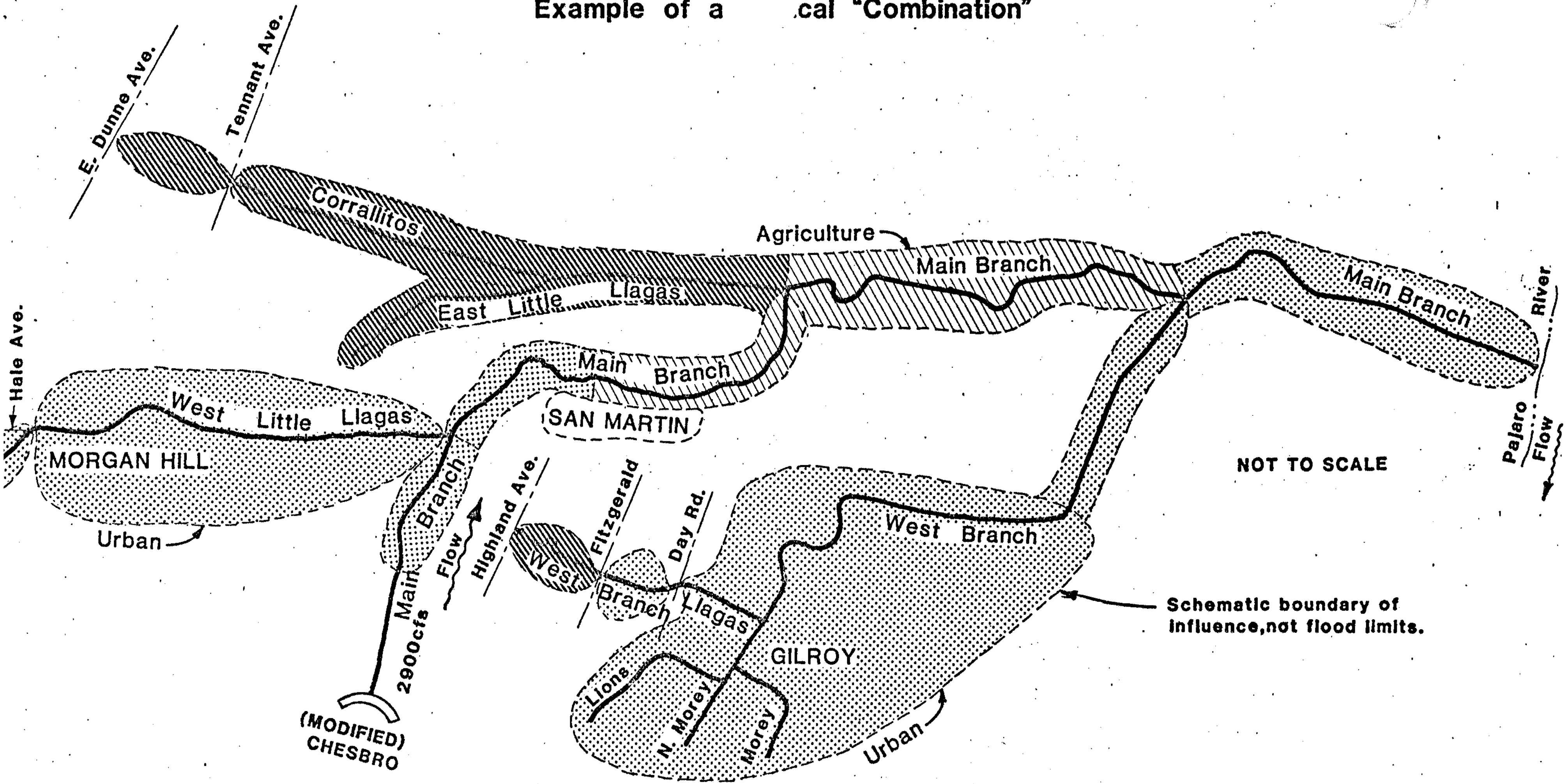
1% Urban-No Induced Downstream Flooding



CASE 5

1% Urban-1% Main Branch Only

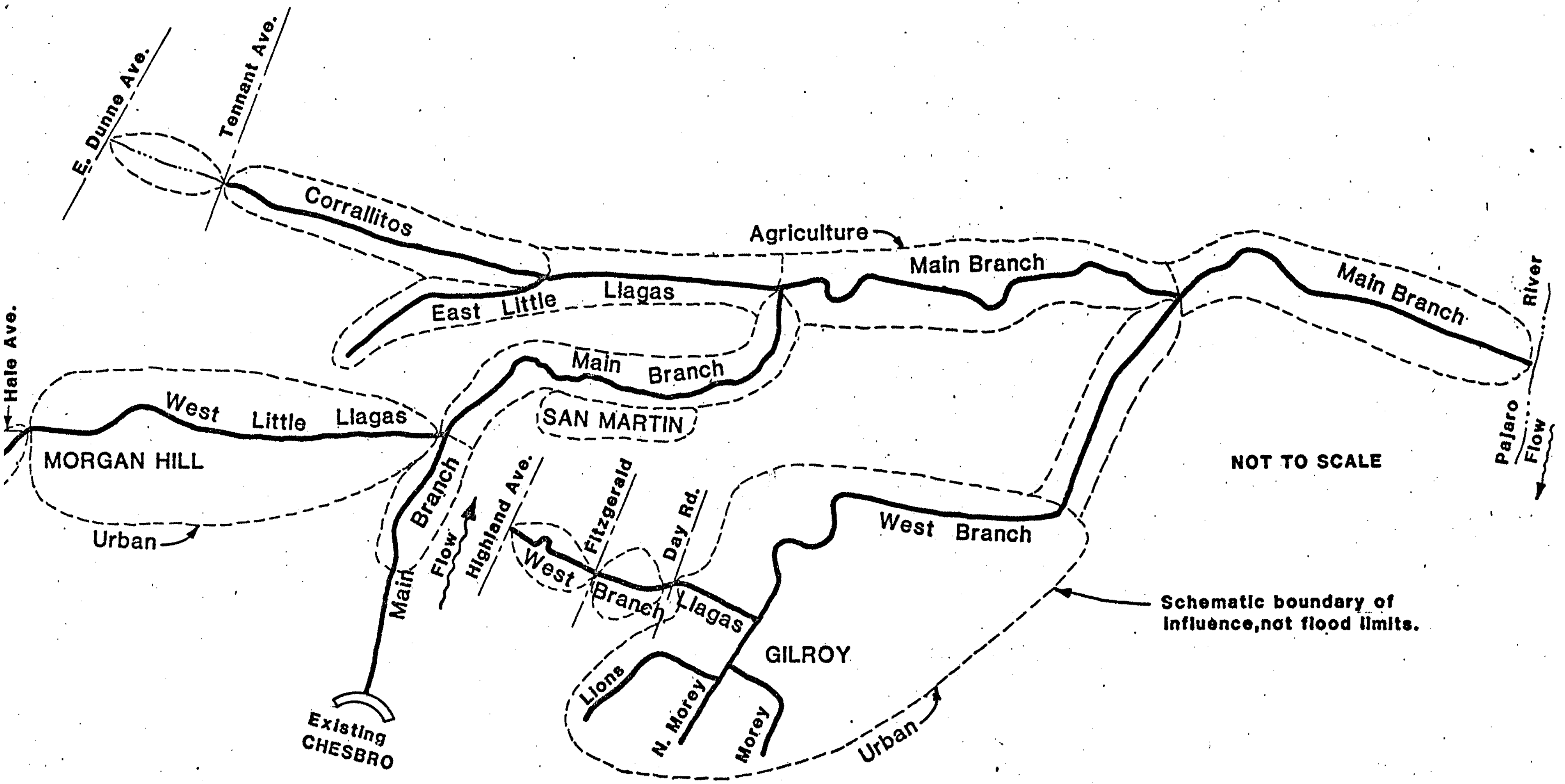
Example of a .cal “Combination”



CASE 6

Typical Combination

The actual combination of “levels of protection” to be investigated will be determined after the cost and benifits for the first five cases are known.

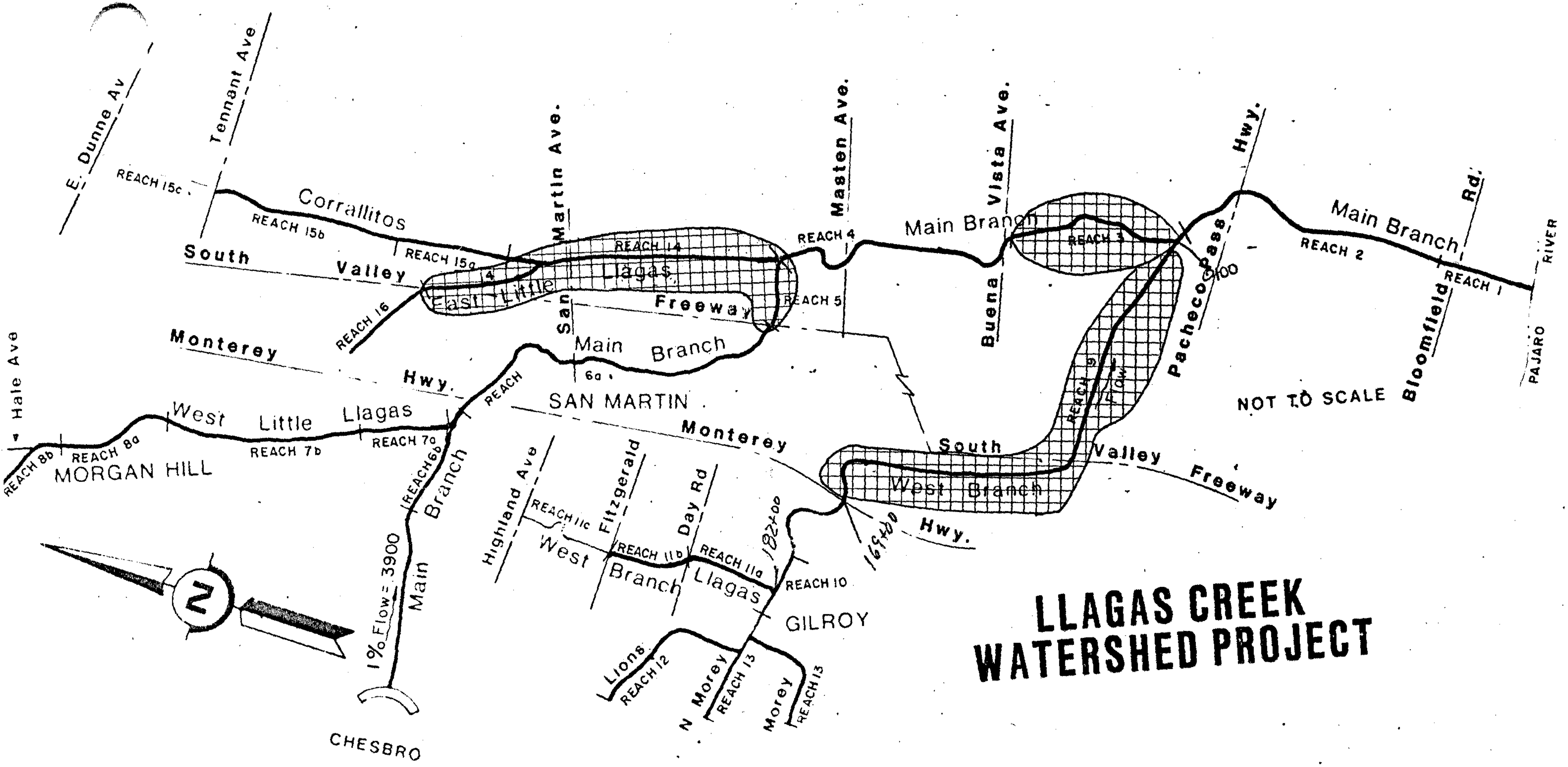


CASE 7

Non-Structural Solution

Examples of non-structural solutions:

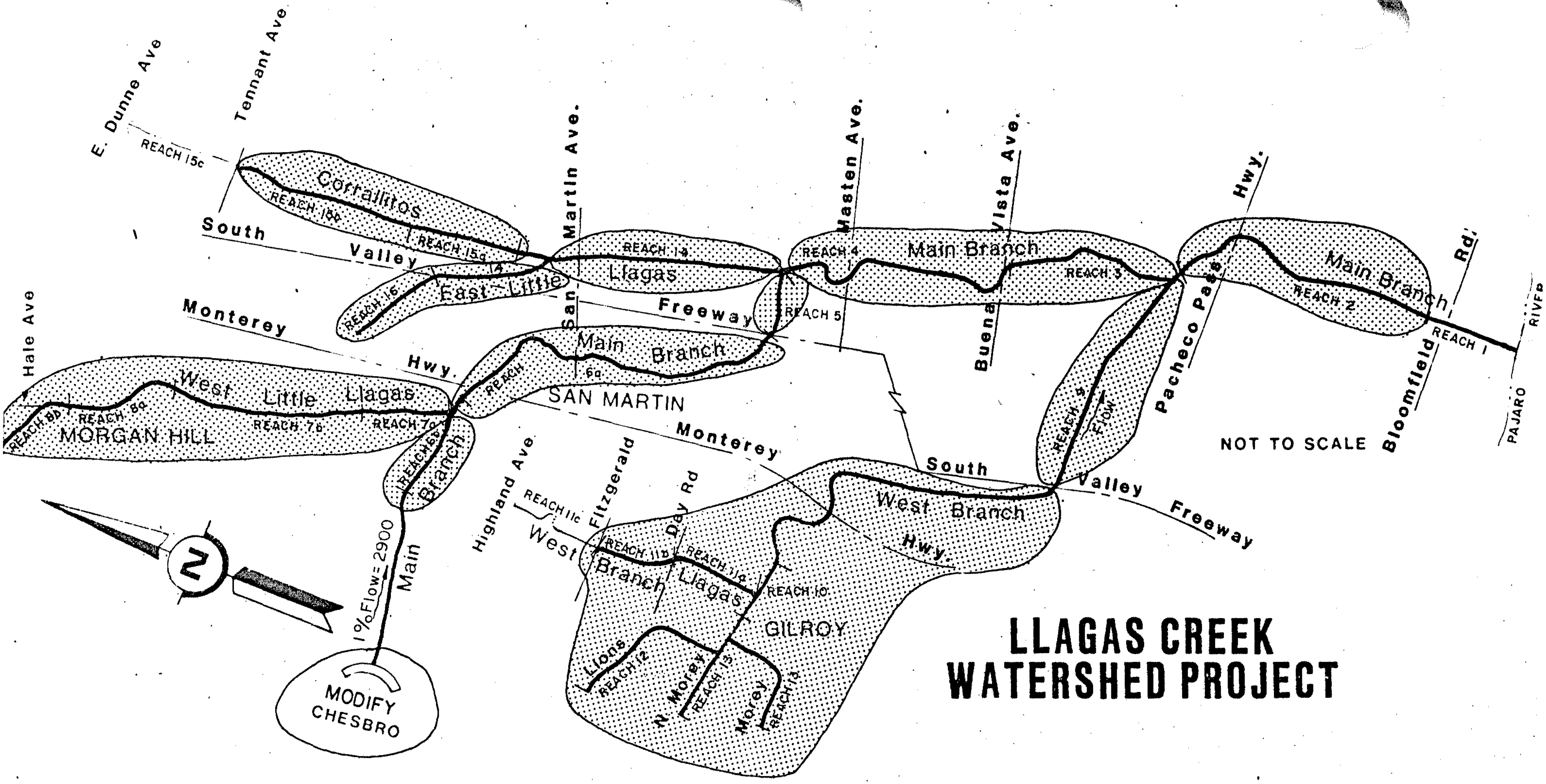
- Flood proofing
- Flood insurance
- Flood warning system
- Relocation of residents from flood plain
- Combination of the above



LLAGAS CREEK WATERSHED PROJECT

▨ Stabilize and revegetate only (fee)
(previously constructed by Caltrans)

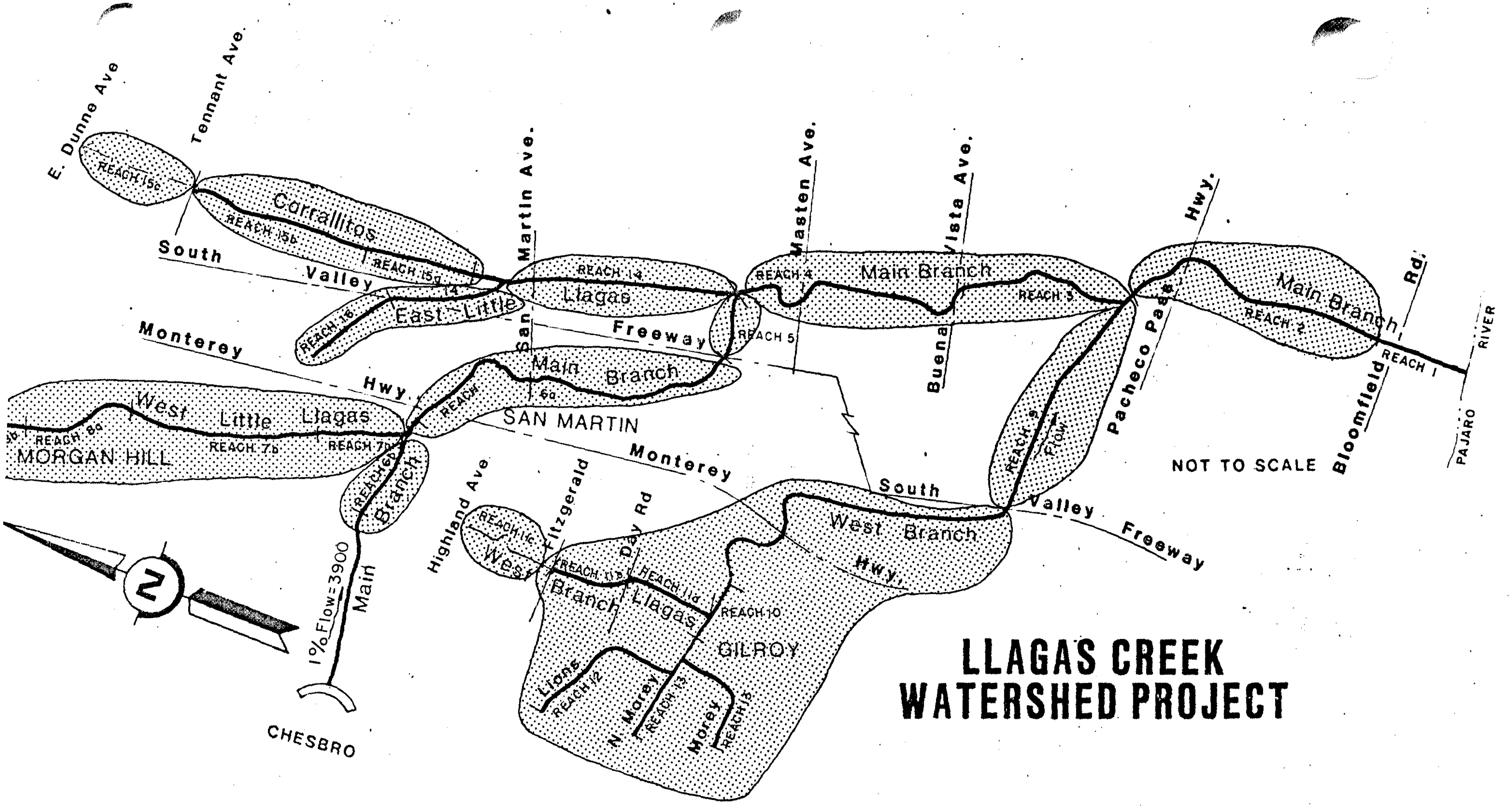
EXISTING



LLAGAS CREEK WATERSHED PROJECT

▨ 1% Channel (fee)

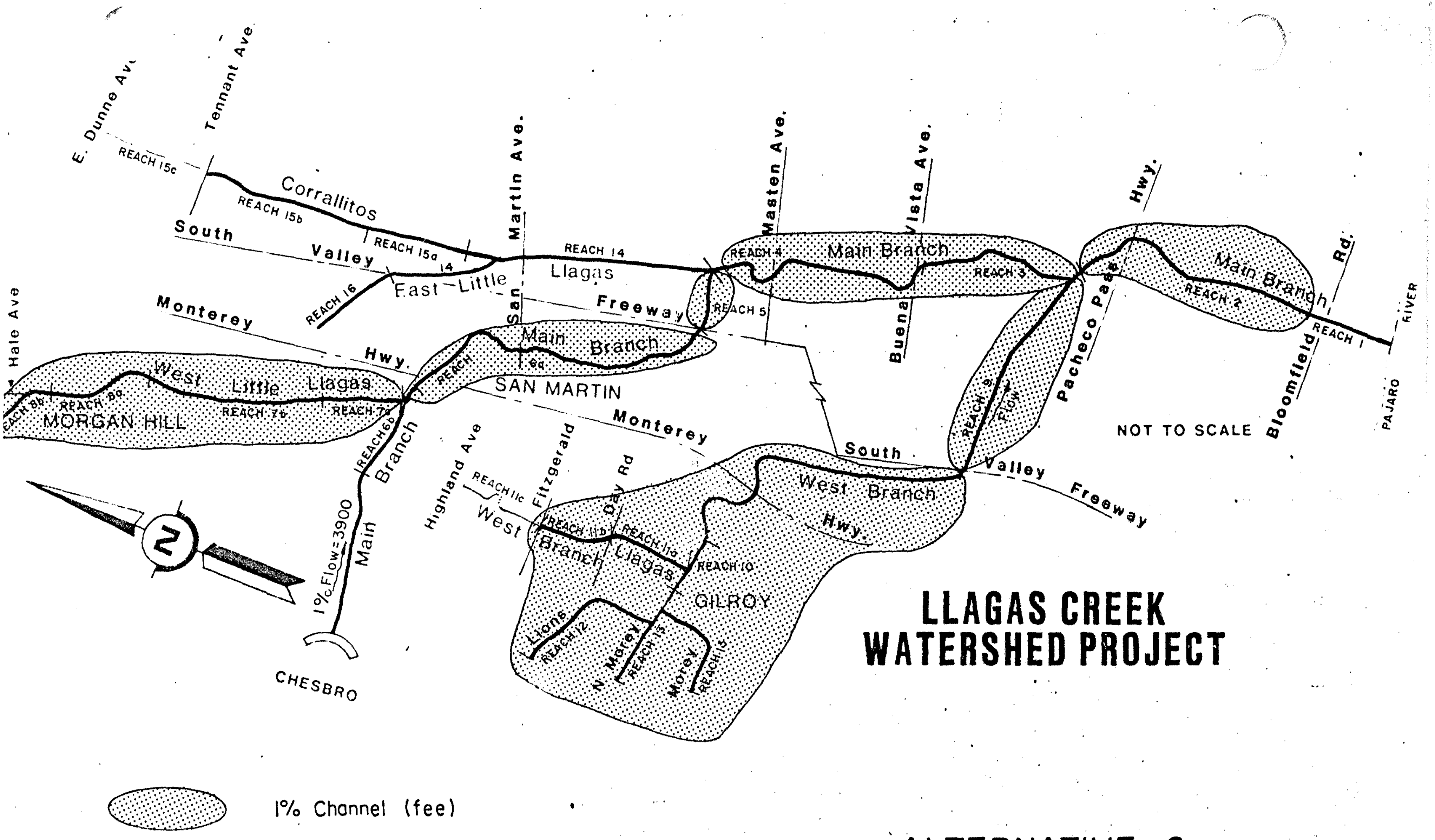
ALTERNATIVE A



LLAGAS CREEK WATERSHED PROJECT

▨ 1% Channel (fee)

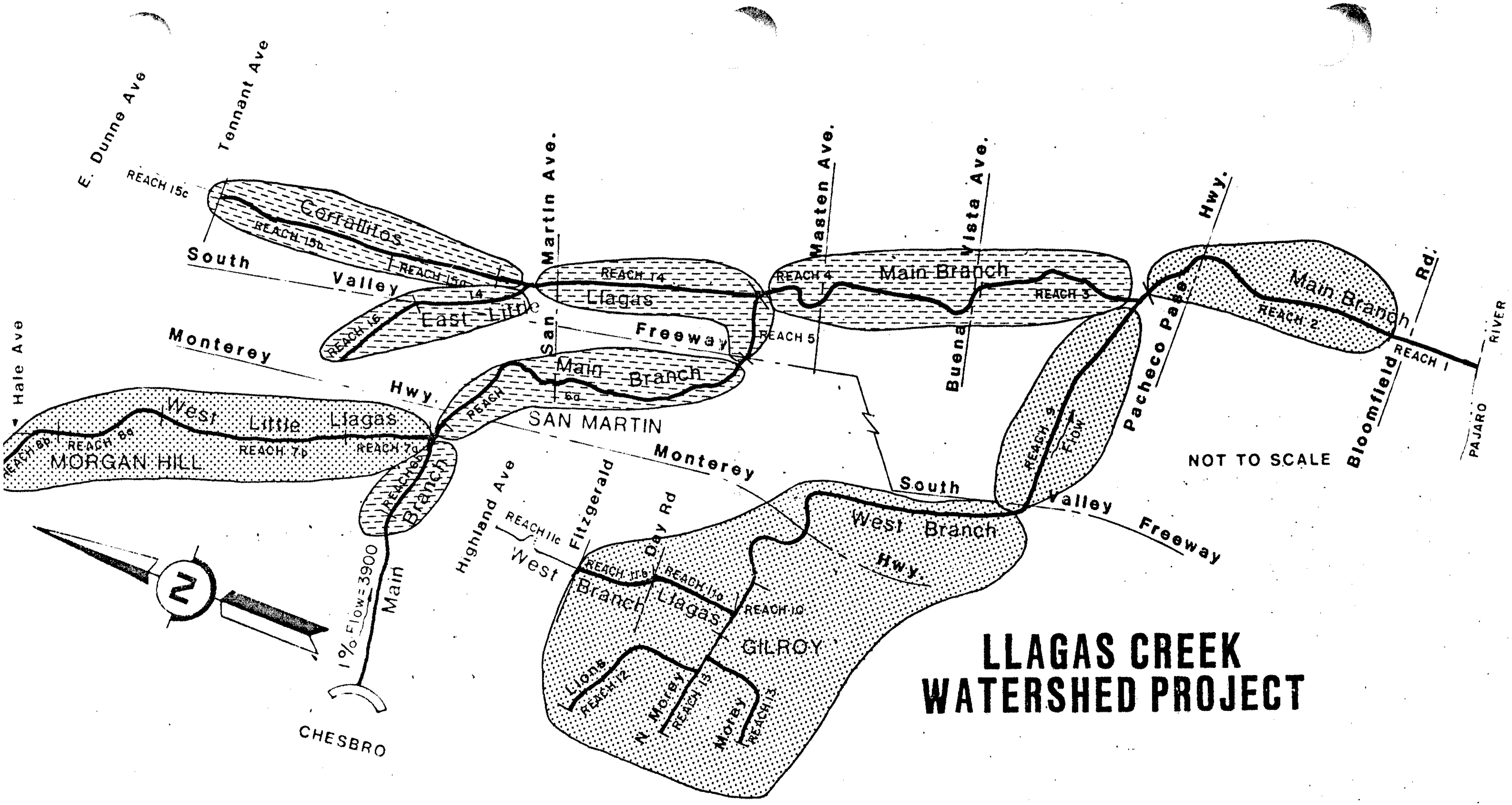
ALTERNATIVE B



LLAGAS CREEK WATERSHED PROJECT

▨ 1% Channel (fee)

ALTERNATIVE C

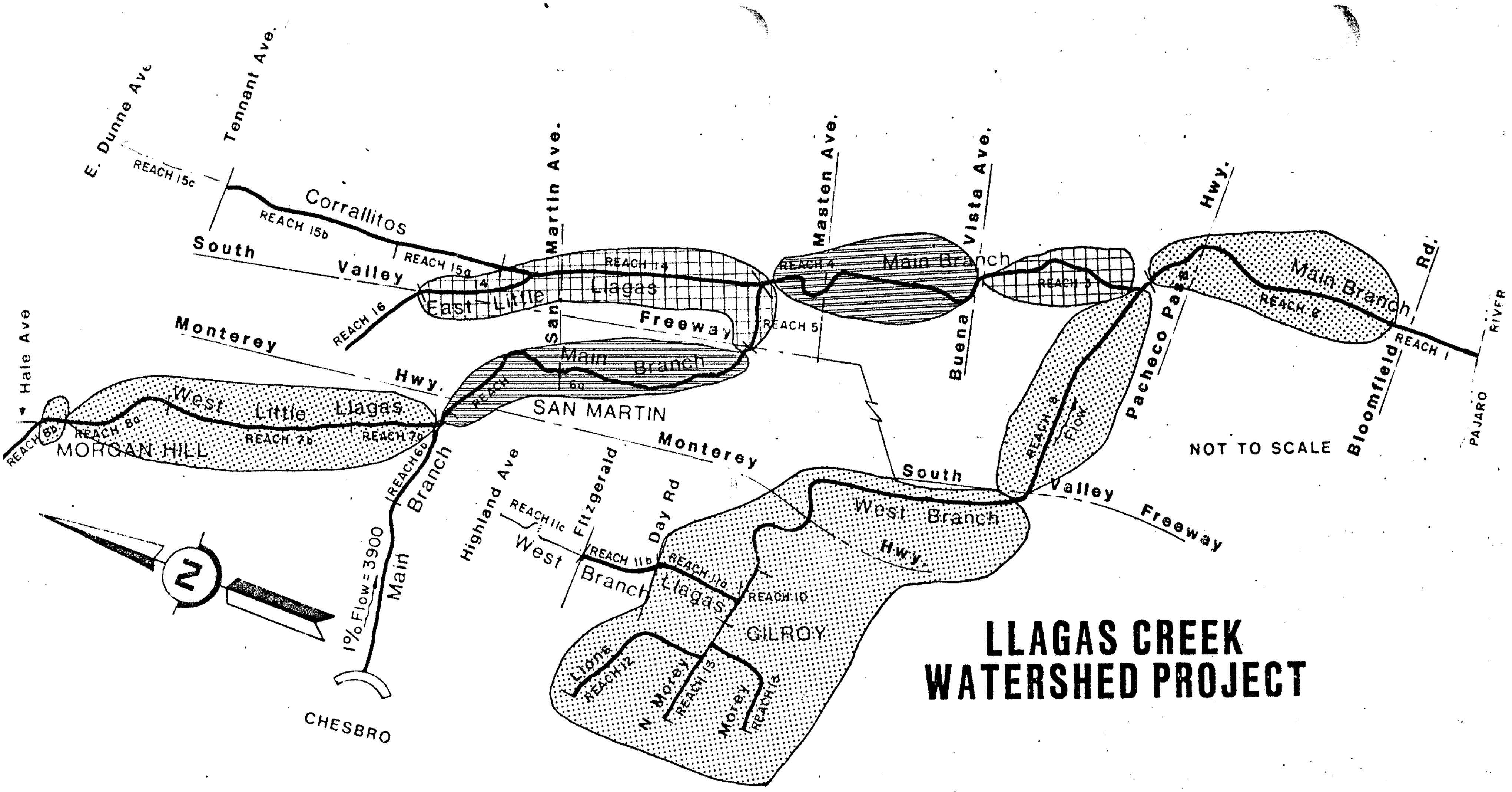


LLAGAS CREEK WATERSHED PROJECT

░ 1% Channel (fee)

▤ 10% Channel (fee)

ALTERNATIVE D



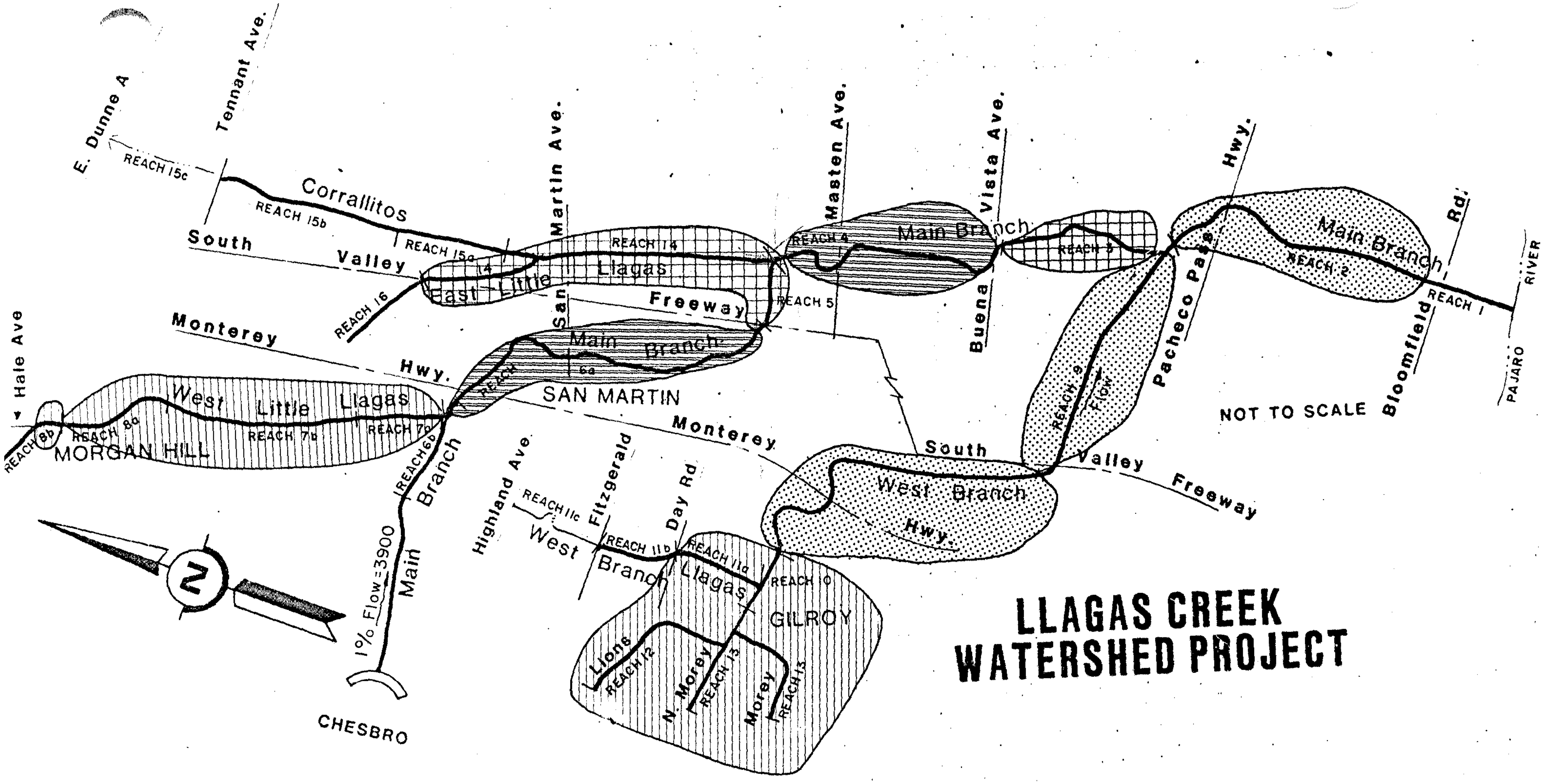
LLAGAS CREEK WATERSHED PROJECT

▒ 1% Channel (fee)

▤ No induced flooding only (easement)

▦ Stabilize and vegetate only (previously constructed by Caltrans) (fee)

ALTERNATIVE E



LLAGAS CREEK WATERSHED PROJECT

░ 1% Channel (fee)

▥ 1% Channel with reduced right of way (fee)

▦ Stabilize and vegetate only (previously constructed by Caltrans) (fee)

▤ No induced flooding only (easement)

ALTERNATIVE F

(1)

10/7/8
JM 12/5/8
35

LOCATION	STATION	PROPOSED 1% DESIGN FLOW (B)	10% DESIGN FLOW	1979 WORK-PLAN DESIGN FLOW (B)	FIS 1% Fl (A)
		(cfs)	(cfs)	(cfs)	(cfs)
MAIN BRANCH	Chesbro Out flow	2900		2900	5900
U/S W. LITTLE LLAGAS	743+00 − 714+00	3460	2370	3430	4800
U/S SAN MARTIN AVE.	714+00 − 625+00	5900	3800	5100	
U/S STA 582+00	625+00 − 582+00	6200	4100	5100	
U/S E. LITTLE LLAGAS	530+00 582+00 − 498+15	6200	4100	5400	5400
U/S RUCKER CR	498+15 − 386+00 △	12,350	7600	8900 ↖	10200
's PANTHER CR	▷ 386+00 − 344+00	13,200	7900	9300	9400
LIVE OAK CR	344+00 − 314+00	13,450	7950	9300	9800
U/S LEAVESLY AVE	314+00 − 290+00	13,800	8100	9300	9800
U/S W. BRANCH LLAGAS	290+00 − 190+80	13,800	8100	10,100	5200
U/S PRINCEVALE	190+80 − 127+40	17,800	10400	16,300	
U/S STA 93+40	127+40 − 93+40	18,300	10700	17,100	11,000
U/S BLOOMFIELD RD	93+40 − 64+00	18,800	11000	13,900	14,800

(1) A LARGE SPILL AT LEAVESLY AVE. IS RESPONSIBLE FOR THIS REDUCTION OF FLOW IN THE MAIN CHANNEL. THE WATER WHICH LEAVES THE MAIN CHANNEL AT THIS POINT FLOWS DOWN LEAVESLY TO THE WEST AND THEN ALONG WITH LOCAL FLOWS TO THE SOUTH. PICKING UP ADDITIONAL u NEAR THE RONAN CHANNEL THE WATER CONTINUES ACROSS HWY. 152 AND ALONG THE MILLER SLOUGH. TOGETHER WITH THE WATERS FROM THE PRINCEVALE DRAIN THE FLOW REENTERS THE MAIN BRANCH NEAR THE

10/7/80
JM 12/8/80
36

LOCATION	STATION	PROPOSED 1% DESIGN FLOW (B)	10% DESIGN FLOW	1979 WORK-PLAN DESIGN FLOW (B)	FIS 1% FLOO (A)
		(cfs)	(cfs)	(cfs)	(cfs)
WEST BRANCH LLAGAS					
U/S FITZGERALD RD	- 297+00	2070	1080		
U/S LIONS CR	297+00 - 182+00	2340	1280	2900	1500
U/S LEAVESLY RD	182+00 - 118+00	4800	2700	4200	N/A
U/S MILLER SLOUGH	118+00 - 55+00	4800	3700	4200	N/A
U/S MAIN BR	55+00 - 0+00	6160	3500	5200	3500
LIONS CREEK					
U/S MOREY AVE	285+00 - 245+00	850	450	800	
U/S MOREY CR.	245+00 - 217+00	950	500	900	940
U/S W. BRANCH	211+00 - 182+00	1840	1050	2000	N/A
N. MOREY CREEK					
U/S LIONS CR	233+00 - 217+00	485	300	280	340
S. MOREY CREEK					
U/S STA 230+00	245+00 - 230+00	200	120	200 ~~450~~	
LIONS CR.	230+00 - 211+00	420	260	450 200	480

* DIFF SMALL

*

(3)

JH [illegible]
10/7/80
JM 12/8/80
37

LOCATION	STATION	PROPOSED 1% DESIGN FLOW (B)	10% DESIGN FLOW	1979 WORK-PLAN DESIGN FLOW (B)	FIS 1% FLO (A)
		(cfs)	(cfs)	(cfs)	(cfs)
WEST LITTLE LLAGAS					
	227+35 - 204+00	640	400	510	400
U/S WRIGHT AVE.	204+00 - 195+15	810	520	510	350
U/S MAIN ST	195+15 - 173+94	810	520	810	600
U/S 5TH ST.	173+94 - 149+00	950	610	1300	600
U/S SPRING ST	149+00 - 138+00	1050	690	1300	500
	138+00 - 130+00	1550	1000	1300	1040
/S EDMUNDSON AVE	130+00 - 96+40	1550	1000	1470	1040
	96+40 - 86+40	1670	1075	1680	1040
U/S EDMUNDSON CR	86+40 - 75+50	1670	1075	1680	1040
U/S MAIN BR	75+50 - 11+00	2200	1400	2160	1380 *
EAST LITTLE LLAGAS					
U/S MADRONE CH	220+85 - 180+50	1480	800	660	1300
U/S CORRALITTOS CR.	180+50 - 121+50	2670	1450	1960	3580 **
U/S SAN MARTIN CR	121+50 - 52+00	5,270	2930	2940	4473 **
U/S CHURCH CR	52+00 - 6+00	6,330	3580	3630	5170 **
U/S MAIN BR.	6+00 - 0+00	6,780	3830	4160	6.140 **

FLOW D/S OF EDMUNDSON CK., DOES NOT REFLECT PROPOSED DIVERSION

**) NOT IN DETAILED STUDY AREA

10/7/80
JM 12/8/80

LOCATION	STATION	PROPOSED 1% DESIGN FLOW	10% DESIGN FLOW	1979 WORK-PLAN DESIGN FLOW	FIS 1% FLOOD (A)
		(cfs)	(cfs)	(cfs)	(cfs)
TENNANT CREEK					
U/S FOOTHILL CR.	126+70 - 106+00	1040	600	660	420 *
U/S CORRALLITOS CR	106+00 - 77+50	1430	830	660	610 *
CORRALLITOS CR					
U/S MIDDLE AVE.	77+50 - 45+20	2,360	1330	1440	1080 *
E. LITTLE	45+20 - 0+00	2,580	1470	1440	1080 *

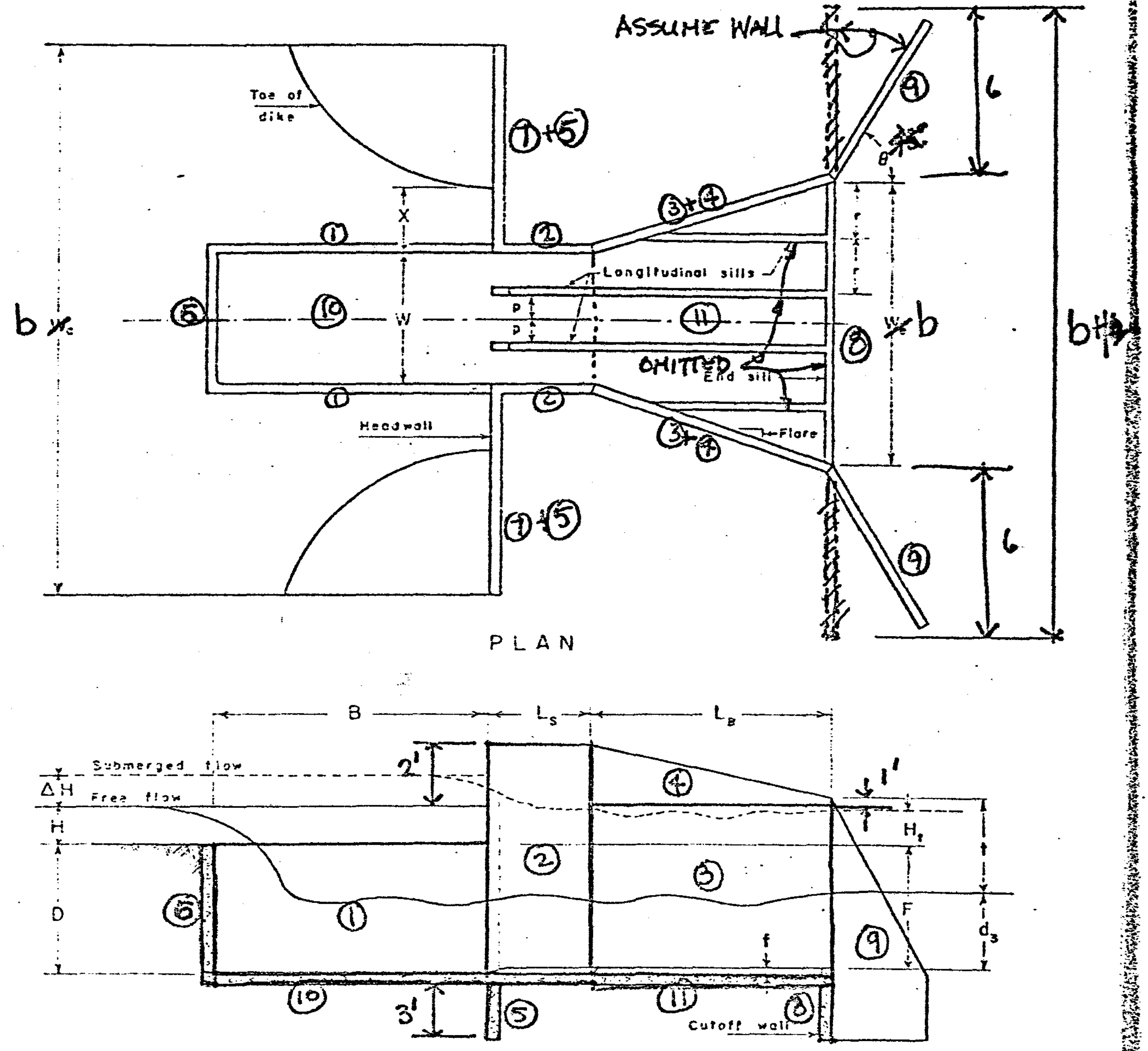
*) NOT IN DETAILED STUDY AREA

LLAGAS CREEK - SELECTED DROP STRUCTURES

	W	B	LS	LB	D		CONCRETE (CU. YD)
17,000	70	70	15	100	6		1350.7
9,000	50	50	12	75	5		824.1
5,000	38	38	9	57	3		488.0
3,000	32	32	7	48	3		270.1
2,000	25	25	6	38	2		237.0
1,000	16	16	5.5	24	5		174.3

DROP STRUCTURES

Q	FRONT WALLS	SIDE WALLS	EXIT WALLS	BOTTOM SLAB	CONCRETE TOTAL CU. YD.
17,000	235.9	279.2	29.4	806.2	1350.7
9,000	172.8	172.7	24.1	454.5	824.1
5,000	105.9	99.6	18.8	263.7	488.0
3,000	71.9	72.9	15.5	181.2	270.1
2,000	57.0	47.7	13.6	118.7	237.0
1,000	61.9	41.8	12.7	57.9	174.3



PLAN

SECTION AT CENTER LINE

FIGURE 1.—Box-inlet drop spillway.

FREE-FLOW CAPACITY

Free flow exists in the box-inlet drop spillway whenever the downstream or tailwater level is so low that it has no effect on the amount of water that will pass the spillway. The problem then is to determine what parts of the spillway affect the flow and to evaluate these effects. Two different sections are effective in controlling the flow: the crest of the box inlet controls the flow up to that point where the box inlet is flooded out; the opening in the headwall controls at higher flows. The flow at which the control changes from one point to the other is dependent upon a number of factors, the principal ones being the box-inlet depth and its length.

Since the primary factors that influence the free flow past box-inlet drop spillways are dif-

LLAGAS CREEK

	⑤ BXW	⑥ $D+1.25' \times W+2\overset{2.50}{(1.25)}$	⑦ ONE SIDE $b-W\ (4.25+D+H+2)$	FRONT WALL TOTAL - 2 SIDES ⑤+⑥+2⑦
000 ~~90~~	210	$\overset{7.25}{6} + 1.25 \times 72.5 = 52\overset{6}{5}.6$	$\overset{80}{150} - 70(4.25 + 6 \overset{27.25}{+} 15 + 2) \cdot 2180$	$\frac{5096 \times 1.25}{27} = 235.9$
000 ~~90~~	150	$\overset{6.25}{5} + 1.25 \times 52.5 = 328.1$	$\overset{70}{120} - 50(4.25 + 5 \overset{23.25}{+} 12 + 2) = 1627.5$	$\frac{3733 \times 1.25}{27} = 172.8$
00	114	$\overset{4.25}{3} + 1.25 \times 40.5 = 172.X$	$\overset{52}{90} - 38(4.25 + 3 \overset{19.25}{+} 10 + 2) = 1001$	$\frac{2283 \times 1.25}{27} = 105.9$
00	96	$\overset{4.25}{3} + 1.25 \times 34.5 = 14\overset{7}{6}.\cancel{6}$	$\overset{38}{70} - 32(4.25 + 3 \overset{17.25}{+} 8 + 2) = 655.5$	$\frac{1544 \times 1.25}{27} = 71.9$
00	75	$\overset{3.25}{2} + 1.25 \times 27.5 = 89.\cancel{4}$	$\overset{35}{60} - 25(4.25 + 2 \overset{15.25}{+} 7 + 2) = 533.75$	$\frac{1231.5 \times 1.25}{27} = 57.0$
00	48	$\overset{6.25}{5} + 1.25 \times 18.5 = 11\overset{6}{5}.6$	$\overset{34}{50} - 16(4.25 + 5 \overset{17.25}{+} 6 + 2) = 586.5$	$\frac{1337 \times 1.25}{27} = 61.9$

DROP STRUCTURE FRONT WALLS

LLAGAS CREEK

Q	① B × D	② Ls(D+H+2)	③ LB(D+H)	④ LB × 3/2	TOTAL 2 SIDES 2(①+②+③+④) (CUYD)
000	70×6 = 420	$15(\overset{23}{6+15+2})=345$	$100(\overset{21}{\cancel{6+15}})=2100$	100 × 1.5 = 150	$\frac{6030\times1.25}{27}=279.2$
,000	50×5 = 250	$12(\overset{19}{5+12+2})=228$	$75(\overset{17}{\cancel{5+12}})=1275$	75 × 1.5 = 112.5	$\frac{3{,}731\times1.25}{27}=172.7$
,000	38×3 = 114	$9(\overset{15}{3+10+2})=135$	$57(\overset{13}{\cancel{3+10}})=741$	57×1.5 = 85.5	$\frac{2151\times1.25}{27}=99.6$
,000	32×3 = 96	$7(\overset{13}{3+8+2})=91$	$48(\overset{11}{3+8})=528$	48×1.5 = 72	$\frac{1{,}574\times1.25}{27}=72.9$
,000	25×2 = 50	$6(\overset{11}{\cancel{2+7+2}})=66$	$38(\overset{9}{\cancel{2+7}})=342$	38×1.5 = 57	$\frac{1030\times1.25}{27}=47.7$
000	16×5 = 80	$5.5(\overset{13}{5+6+2})=71.5$	$24(\overset{11}{5+6})=264$	24×1.5 = 36	$\frac{903\times1.25}{27}=41.8$

DROP STRUCTURE SIDE WALLS

LLAGAS CREEK

Q	⑧ 3 × b	⑨ $4.25 \times 6 + \overset{3}{\frac{6}{2}}(D+H+1)$	TOTAL ⑧ + 2×⑨	
000	450	$26.5 + 3(\overset{66}{6} + \overset{22}{15} + 1) = 92.5$	$\frac{635 \times 1.25}{27}$	= 29.4
,000	360	$26.5 + 3(\overset{54}{5} + \overset{18}{12} + 1) = 80.5$	$\frac{521 \times 1.25}{27}$	= 24.1
,000	270	$26.5 + 3(\overset{42}{3} + \overset{14}{10} + 1) = 68.5$	$\frac{407 \times 1.25}{27}$	= 18.8
,000	210	$26.5 + 3(\overset{36}{3} + \overset{12}{8} + 1) = 62.5$	$\frac{335 \times 1.25}{27}$	= 15.5
,000	180	$26.5 + 3(\overset{30}{2} + \overset{10}{7} + 1) = 56.5$	$\frac{293 \times 1.25}{27}$	= 13.6
000	150	$26.5 + 3(\overset{36}{5} + \overset{12}{6} + 1) = 62.5$	$\frac{275 \times 1.25}{27}$	= 12.7

DROP STRUCTURE EXIT WALLS

LLAGAS CREEK

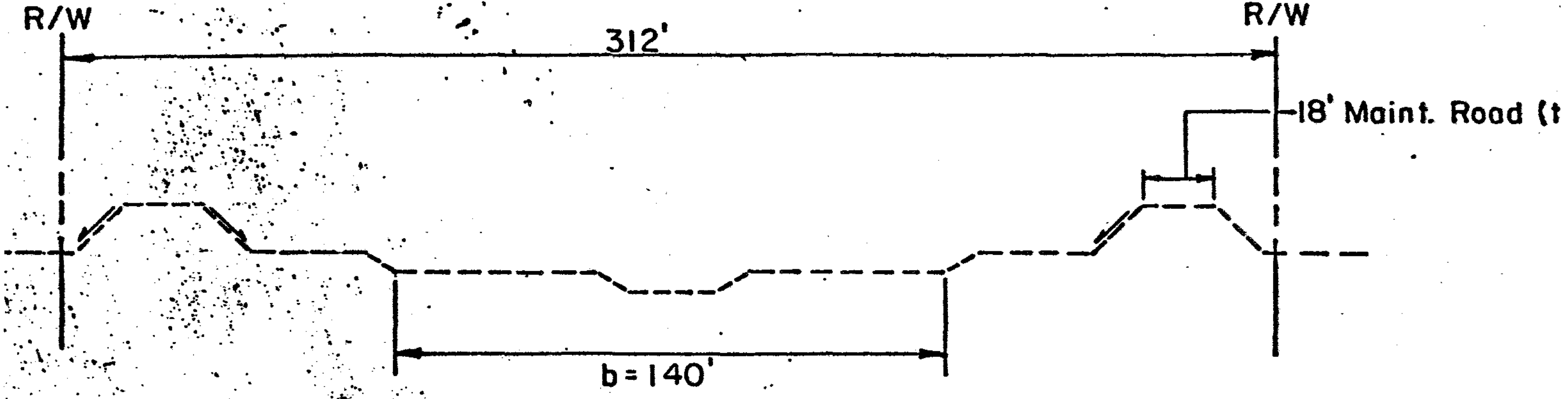
Q	⑩ $W+2(1.25)(B+L_s)$	⑪ $L_B\left[\frac{W+2\overset{2.50}{(1.25)}+b+2\overset{2.50)}{(1.25)}}{2}\right)$	TOTAL 10 + 11
500	$\overset{72.5}{70+2.50}\left(\overset{85}{70+15}\right)=616\overset{2}{\cancel{3.5}}$	$\overset{50}{100}\left[\frac{72.5\overset{225}{+}152.5}{2}\right)=11{,}250$	$\frac{17413\times1.25}{27}=806.2$
000	$\overset{52.5}{50+2.50}\left(\overset{62}{50+12}\right]=3255.0$	$75\left(\frac{52.5\overset{175}{+}122.5}{2}\right)=6{,}56\overset{3}{\cancel{2.5}}$	$\frac{9818\times1.25}{27}=454.5$
.000	$\overset{41.5}{38+2.50}\left(\overset{47}{38+9}\right)=190\overset{4}{3}.5$	$57\left(\frac{40.5\overset{133}{+}92.5}{2}\right)=3{,}79\overset{1}{\cancel{0.5}}$	$\frac{5695\times1.25}{27}=263.7$
000	$\overset{34.5}{32+2.50}\left(\overset{39}{32+7}\right)=134\overset{4}{5}.5$	$48\left(\frac{34.5\overset{107}{+}72.5}{2}\right)=2{,}568$	$\frac{3914\times1.25}{27}=181.2$
,000	$\overset{27.5}{25+2.50}\left(\overset{31}{25+6}\right)=85\overset{3}{\cancel{2.5}}$	$38\left(\frac{27.5\overset{90}{+}62.5}{2}\right)=1{,}710$	$\frac{2563\times1.25}{27}=118.7$
000	$\overset{18.5}{16+2.50}\left(\overset{21.5}{16+5.5}\right)=39\overset{8}{\cancel{7}}75$	$24\left(\frac{18.5\overset{71}{+}52.5}{2}\right)=852$	$\frac{1250\times1.25}{27}=57.9$

DROP STRUCTURE BOTTOM SLAB

Reach 1

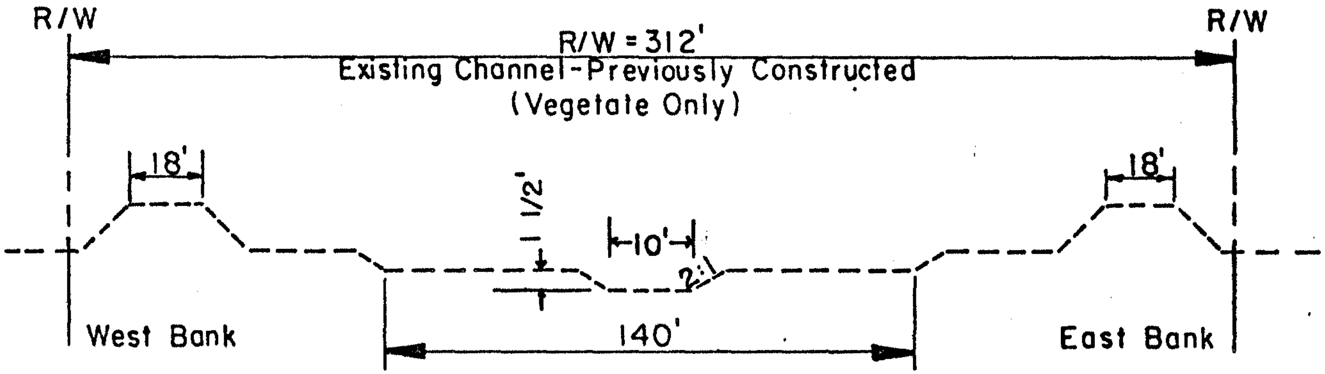
This reach extends from station 0+00 to 64+00 on Llagas Creek. This reach has already been constructed.

REACH 1



STA 0+00 TO STA 64+00 - REACH I
COMPLETED PROJECT

MAIN BRANCH LLAGAS CREEK



STA 0+00 (confluence with Pajaro) To STA 64+00 (1700' u/s of Bloomfield)

PAJARO RIVER TO 1700' U/S OF BLOOMFIELD ROAD

REACH 1

FIGURE 2

2/8/80
Rev. 2/11/80

Detailed Breakdown of Expenditures

FEDERAL

SCS has spent a total of $1,600,000 so far on the Llagas Creek Watershed Project (Ref: W. Sykes)

Lower Watershed

Reach 1 $580,000 construction, $145,000 Engr. & Surv. = $725,000
Reach 2 $157,000 contract w/District for design Reach 2 = 157,00
Labor for planning and adm. Say ½ in Lower 718,000/2 = 359,00
1,241,000

Upper Watershed

Labor for planning and adm. Say ½ in Upper 718,000/2 = 359,000
$359,000

TOTAL Federal = $1,600,000

NON FEDERAL

Lower Watershed

Right of way purchase (Dist. & Caltrans) $1,504,000
Total District Labor is $1,042,000. Of this, 635,000 was in The Lower Watershed. However, some of This was reimbursed by SCS and included above under Fed-Lower (Say 157,000 contract + about 60,000 for design of Reach 1 = 217,000). So non-fed labor in Lower Watershed is about 635,000 - 217,000 = 418,000
$1,922,000

Land Treatment Measures in Lower Watershed 143,000
Lower Watershed TOTAL = $2,065,000

2/8/80

Non-Federal Cont'd

Upper Watershed

Right of way purchases (Dist & Caltrans)	$ 400,000
Total District labor in Upper W/S is $407,000. Assume that it was all for Planning and R/W purchase labor	407,000
	$ 807,000
Land Treatment Measures in Upper Watershed	617,000
Upper watershed TOTAL =	$ 1,424,000

TOTAL Non-Federal = $ 3,489,000

TOTAL SPENT SO FAR ON PROJECT = $ 5,089,000

Land Reimbursement Summary

Land: Total land purchases to date. $1,542,000

$302,000	by District, reimbursed by DWR
1,602,000	by Caltrans, reimbursed by DWR
$1,904,000	

District Records Ref: Jeff Smith 2/7/80

(South Zone Fund, mostly for The Llagas Cr. Project)

$302,337	Land purchased by District
1828,760	Structures & Improvements (incl Land Treatmt)
$2,131,097	TOTAL
<843,376>	Reimbursed by either DWR & or SCS to District
$1,287,721	TOTAL DISTRICT OUTLAY

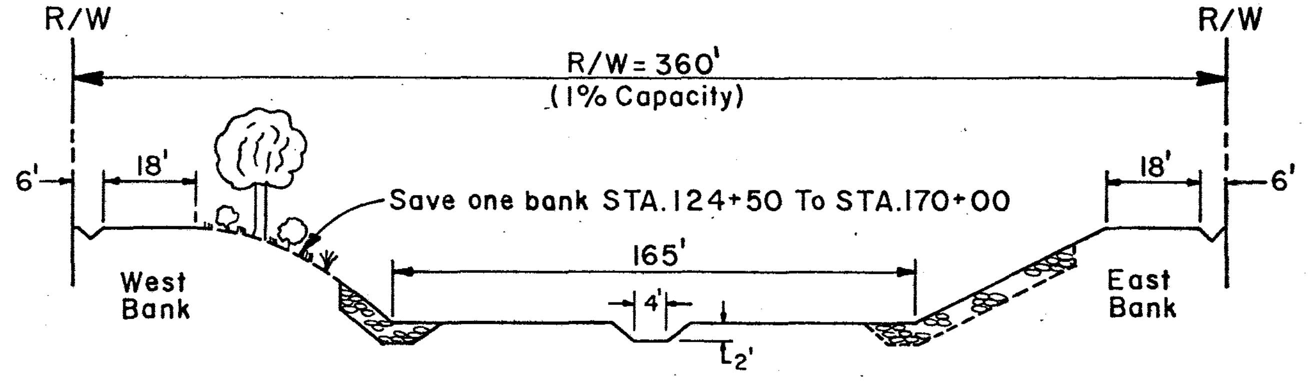
Summary of Outlays

$1,288,000	District	Ref: J. Smith 2/7/80
1,600,000	SCS (Federal)	Ref: Walt Sykes Jan 1980
1,904,000	DWR (for land)	
297,000	Either DWR, or SCS probably for Land Treatment	
$5,089,000		

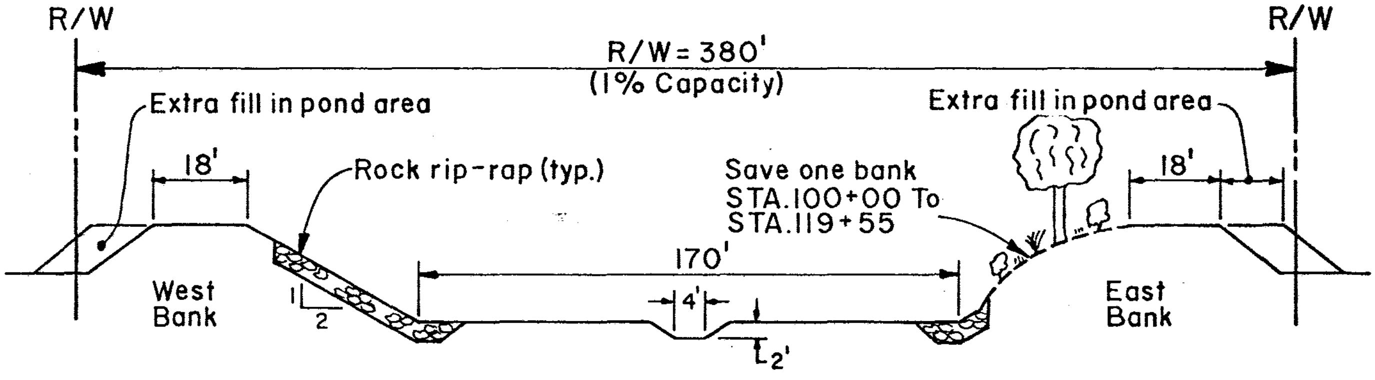
Reach 2

This reach extends from station 64+00 to 182+00 on Llagas Creek. The channel has an earthen trapezoidal cross-section with a low flow channel. Two drop structures are needed for stability. The drops incorporate fish ladders. The lower flow channel and fish ladders are required to assure fish migration. The bridge at Bloomfield Road will be replaced.

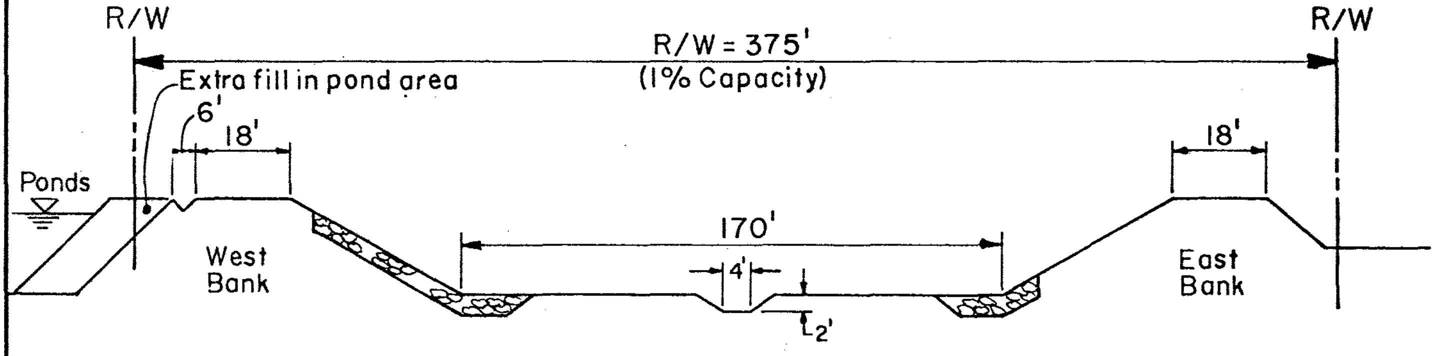
MAIN BRANCH LLAGAS CREEK



STA. 133+55 To STA. 182+00



STA.100+00 To STA.133+55



STA.64+00 To STA.100+00

1700' U/S OF BLOOMFIELD RD. TO ROUTE 152

REACH 2

FIGURE 2

ok
[illegible]

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 2

1% Flood
Case 1, 5.6

Item	Quantity	Unit Cost	$
Channel Excavation	928,617	2.80 CY	2,600,128
Compacted Embankment			
Drop Structures	2800 ~~3016.2~~	350.00 CY	980,000 ~~1,055,670~~
Drainage Inlets	12	6000.00 EA.	72,000.00
Riprap	22,455	40.00 CY	898,199
ter Stone	Included above		
S ing	31.2 Ac.	2,000.00 Ac.	62,400
Landscaping		3%	151272 ~~153,542~~
Structural Excavation	0	3.00 S.F	—
Rectangular Concrete Channel	0	250.00 CY	—
Compacted Backfill	0		—
Levee Embankment	0	2.25 C.Y.	—
Site Preparation (Levees)	104.8	4,100.00 Ac.	429,680
Mobilization		~~6%~~ 3%	155810 316,297

Subtotal	5,349,489 ~~5,587,916~~
~~15%~~ 12% Contingency	641,939 ~~670,550~~
TOTAL	5,991,428 6,258,466

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PROJECT

DATE CHECKED BY DATE JOB NO.

Page 57 Deleted

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LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 2

1% Flood
Case 1,3,5,6

Item	Quantity	Unit Cost	$
State and County Bridges	8320	45.00 SF	374,400
Private Bridges	2600	40.00 SF	104,000
Barbed Wire Fence	23,600 L.F.	6.00 L.F.	141,600
Relocation of Utilities			11,400

Subtotal 631,400

~~10~~ 12
~~15%~~ Contingency 75,768

TOTAL 707,168

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	3.9 ac	200.00 Ac	780
Agricultural	49.2	8000.00 Ac	393,600
Potential Residential (low value)		15,000 Ac	
Potential Residential (medium value)		20,000 Ac	
Residential/School			
Landscaping Addition	Included		

TOTAL 394,380

JM 1/7/80
60

1981 APR 20 PM 3:34

LO NO UCED ODING FS 7/81	Location	Design Discharge (cfs) AH."A" B Case I	 AH. "D" Case II	 Void Case III	 Case IV	 Case V	* Void Case VII	EXIST CHAN CAPAC (cf 1/26/
	Main Branch							
0	743+00 - 714+00	3460	2370	3460	3460	3460	3460	3500 5,00
00	714+00 - 687+00	5,900	3800	5900	5,600	5,900	5900	4,00 ~8,0
00	687+00 - 625+00	5,900	3800	5900	5,700	5,900	5900	4,00 ~8,0
00	625+00 - 552+00	5900	4100	5900	5,700	5,900	5700	~8
00	552+00 - 543+00	5900	4100	5900	5700	5,700	5700	5,0 8,0
00	543+00 - 536+00	5900	4100	5900	5200	5,900	5200	2,5
00	536+00 - 518+00	5900	4100	5900	4700	5,900	4700	4,00 4,9
50	518+00 - 498+15	5900	4100	5900	4900	5,900	4900	2,5 5,00
ch 4. 500	498+15 - 462+00	12,600	7,600	12,600	8050	12,600	8050	~3,0
00	462+00 - 441+00	12600	7,600	12,600	8,500	12,600	8500	1,50 3,50
00	441+00 - 420+00	12600	7,600	12,600	6,500	12,600	6,500	2,50 5,00
00	420+00 - 386+00	12600	7,600	12,600	6,500	12,600	6,500	2,50 5000
-13 500	386+00 - 344+00	13200	7,900 **	13200	10,300	13,200	10,300	9,30
00	344+00 - 314+00	13450	8,100	13450	10,400	13,450	10,400	9,30
100	314+00 - 290+00	13800	8,100	13800	7,800	13,800	7,500	3,00
00	290+00 - 190+80	13800	8,100	13800	7,800	13,800	7,500	2,00 8,00
000	190+80 - 182+00	17800	10,400	17,800	8,600 *	17,800	17,800	
d 2 000	182+00 - 127+40	17800	10,400	17,800	8,600	17,800	17,800	2,000 6,00
	127+40 - 93+40	18300	10,700	18,300	10,800	18,300	18,200	3,00 6,00
00	93+40 - 64+00	18,800	11,000	18,800	10800	18,800	18,800	

REACH 2

District stationing	Alt. A, C, E Case 1, 3, 5, 6 1%	Alter. D. Case 4 1%	Alt. B Case 2 10%
℄ STATion 22+00 to ℄ Sta 54+00	(17,100) 18,800	10,400	(7,200) 11,000
℄ STATion 54+00 to ℄ Sta 91+00	(17,100) 18,300	10,400	(7,200) 10,700
℄ STATION 91+00 to ℄ Sta 137+60	(16,300) 17,800	10,400	(7,200) 10,400

Note: See HEC II Summary

B.K.
12/22/20
62

REACH 2 CASE 1

$$K' = \frac{Q\,n}{S^{1/2}\,b^{8/3}} = \frac{(18{,}600)(0.068)}{(0.001)^{1/2}\,b^{8/3}}$$

S	b	K'	Dn/b	Dn	A	V	E	F.B.	H	R/W
0.001	150	0.0636	0.1430	21.5	4138	4.54	21.82	4.36	25.86	371
	160	0.0526	0.1299	20.8	4188	4.49	21.11	4.22	25.0	378
	170	0.0456	0.1185	20.1	4234	4.44	20.4	4.08	24.2	385
	180	0.0391	0.1085	19.5	4273	4.40	19.8	3.96	23.5	392

adjust b for Hec II til' conditions upstream are met

Use b=170'

REACH 2 CASE 1:3

erosion check $Q_{10\%} = 11,000$ cfs $n = 0.025$

$$K' = \frac{Q\,n}{S^{1/2}\, b^{8/3}} = \frac{(11,000)(0.025)}{(0.001)^{1/2}\; b^{8/3}}$$

S	b	K'	Dn/b	Dn	A	V	E	F.B.	H	R/W
0.001	150	0.0137								
	155	0.0125								
	160	0.0115	0.0531	8.49	1504	7.31				
	165	0.0106								
	170	0.0098	0.0484	8.22	1532.6	7.17	9.0	1.80	10.0	

$$A = \frac{11,000}{6} = 1833.3 \text{ s.f.}$$

B.K. 69
12/22/80

Case 1 64+00 → 148+95

$Q_{12} = 17,800$ C.F.S Sta 182+00 to Sta 127+40 ← Dist. Station

$Z = 2$ $n = 0.069$, $S = 0.001$

$$K' = \frac{(17,800)(0.069)}{b^{8/3}\,(0.001)^{1/2}} = \frac{38,837}{b^{8/3}}$$

b	K'	D_n/b	D_n	A	V.	F.B.	H	T	R/W
120	0.1109								
125	0.0994	0.1834	22.9	3918	4.54	4.64	27.5	235	353
130	0.0896	0.1732	22.5	3941	4.52	4.56	27.1	238	356
135	0.0810	0.1637	22.1	3960	4.49	4.48	26.6	241	359
140	0.0735	0.1551	21.7	3982	4.47	4.40	26.1	244	362
145	0.0669	0.1471	21.3	4004	4.45	4.32	25.6	248	366
150	0.0611	0.140	21.0	4027	4.42	4.26	25.3	251	369
155	0.0560	0.1331	20.6	4048	4.40	4.18	24.8	254	372
160	0.0515	0.1269	20.3	4073	4.37	4.11	24.4	257	376
$\boxed{170}$	0.0438	0.1158	19.7	4120	4.32	4.0	23.7	265	383
180	0.0376	0.1061	19.1	4166	4.27	3.87	23.0	272	390
190	0.0326	0.0977	18.6	4217	4.22	3.78	22.4	280	398
200	0.0284	0.0904	18.1	4267	4.17	3.67	21.8	287	405
210	0.0249	0.0835	17.5	4299	4.14	3.55	21.1	294	412
220	0.0220	0.0777	17.1	4346	4.10	3.47	20.6	302	420
230	0.0196	0.0727	16.7	4406	4.04	3.39	20.1	310.4	428

BK
12/22/80

Case 1

148+95 → 182+00
Sta 133+00 to Sta 136+95 ← Dist. Station

$Q_{1\%} = 17{,}800$ cfs $n = 0.035$, $S = 0.0007$

$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(17{,}800)(0.035)}{b^{8/3} (0.0007)^{1/2}} = \frac{23{,}547}{b^{8/3}}$$

b	K'	dn/b	dn	A	V	F.B.	H	T	R/W
110	0.0848	0.1680	18.48	2715	6.55	3.8	22.3	199	317
120	0.0672	0.1475	17.70	2751	6.47	3.7	21.4	205	324
130	0.0543	0.1308	17.01	2790	6.38	3.5	20.5	212	330
140	0.0446	0.1170	16.4	2829	6.29	3.4	19.8	219	337
150	0.0371	0.1056	15.8	2878	6.18	3.3	19.1	226	344
160	0.0312	0.0953	15.2	2903	6.13	3.2	18.4	233	351
170	0.0266								
180	0.0228								
190	0.0197								
200	0.0172								
210	0.0151								

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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STATE Calif		PROJECT Lower Llagas		
LLH	DATE 7/24/81	CHECKED BY	DATE	JOB NO.
SUBJECT Reach 2				SHEET ____ OF ____

64+00 – 93+40
Aged

```
WP PROG    17
   DATA
   18800.          Q1
     170.           B
       2.           Z
    0.001           S
    0.068           N

   OUTPUT
      20.1          D
     250.4          T
   4225.02          A
16.25695908         R
18736.92021        Q2
4.434753022         V
 Q1/Q2 RATIO
1.003366604
    END
```

As built

```
WP PROG    17
   DATA
   11000.          Q1
     170.           B
       2.           Z
    0.001           S
    0.025           N

   OUTPUT
       8.2          D
     202.8          T
   1528.48          A
7.395697473         R
10905.81148        Q2
7.135069797         V
 Q1/Q2 RATIO
1.008636544
    END
```

93+40 – 127+40

Aged

```
WP PROG    17
   DATA
   18300.          Q1
     170.           B
       2.           Z
    0.001           S
    0.069           N

   OUTPUT
      19.9          D
     249.6          T
   4175.02          A
16.12004808         R
18144.25611        Q2
4.345908788         V
 Q1/Q2 RATIO
1.008583647
    END
```

As Built

```
WP PROG    17
   DATA
   10700.          Q1
     170.           B
       2.           Z
    0.001           S
    0.025           N

   OUTPUT
       8.1          D
     202.4          T
   1508.22          A
7.31349308          R
10681.36443        Q2
7.082099715         V
 Q1/Q2 RATIO
1.00174468
    END
```

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif		PROJECT Lower Llagas		
Y LLH	DATE 7/24/81	CHECKED BY	DATE	JOB NO.
UBJECT Reach 2				SHEET ______ OF ______

127+40 — 182+00

Aged

```
   WP PROG    17
      DATA
      17800.          Q1
        170.           B
          2.           Z
        0.001          S
        0.035          N

     OUTPUT
         13.3          D
        223.2          T
      2614.78          A
 11.39439926           R
 17776.52529          Q2
 6.798478377           V
   Q1/Q2 RATIO
 1.001320545
       END
```

As Built

```
   WP PROG    17
      DATA
      10400.          Q1
        170.           B
          2.           Z
        0.001          S
        0.025          N

     OUTPUT
           8.          D
         202.          T
        1488.          A
 7.231125764           R
 10458.89192          Q2
 7.028825216           V
   Q1/Q2 RATIO
 .9943692006
       END
```

5) structural elements, and 6) miscellaneous criteria. The criteria used in each of these categories are as follows:

1. Flow Rates – Figure 1 summarizes the flow rate for the 100-year flow and 10-year flow after the proposed project is built. These flow rates correspond to various locations along Llagas Creek as indicated in the following table.

Figure 1

LOCATION	*100-YEAR FLOW	*50-YEAR FLOW	*10-YEAR FLOW
C_L Station 22+00 to C_L Station 54+00	-	13,900	7,200
C_L Station 54+00 to C_L Station 91+00	17,100	-	7,200
C_L Station 91+00 to C_L Station 137+60	16,300	-	7,000

The stationing used in the construction plans is not the same stationing shown in the Work Plan Engineering Appendices dated April, 1966. Figure 2 shows the correlation between the two sets of stationing.

Figure 2

Engineering Appendix Stationing (Approx. Stationing)	Santa Clara Valley Water District Stationing	Comments
49+00 (±)	10+10	Bloomfield Road Bridge
60+40 (±)	22+00	Begin Reach 2 Project
93+40 (±)	54+00	End of 2% Channel Design
126+55 (±)	89+00	New Farm Bridge Location
133.55 (±)	96+00	New Drop Structure
148.95 (±)	111+40	New Drop Structure
176+55 (±)	139+00	Pacheco Pass Highway

* These design discharges were computed by the Soil Conservation Service. (see Section I, Item 6 for reference)

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```
**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED JULY1979
  ERROR CORR -  01,02,03
  MODIFICATION -  50,51,52
**************************************************


NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SU

LLAGAS CREEK    REACH TWO

SUMMARY PRINTOUT


                SECNO        Q          VCH       DEPTH    K*XNCH     CWSEL      ELMIN
                                                      F.B.
b=170 60+40    22.000  18800.00        4.82      16.35 3.34  63.00    152.50     136.15

               32.000  18800.00        5.38      16.97 3.48  63.00    154.12     137.15

               42.000  18800.00        5.20      17.46 3.58  63.00    155.61     138.15

               54.000  18300.00        4.97      17.90 3.66  63.00    157.       13  5

               62.000  18300.00        4.91      18.07 3.69  63.00    158.22     140.15

  119+55       82.000  18300.00        4.62      19.02 3.87  63.00    161.17     142.15

               92.000  18300.00        4.76      19.00 3.87  63.00    162.15     143.15

               95.000  17800.00        4.64      18.98 3.84  35.00    162.43     143.45

  133+55       96.100  17800.00        6.13      14.91 3.09  35.00    163.47     148.56

               97.000  17800.00        6.12      14.93 3.10  69.00    163.58     148.65

              100.000  17800.00        5.88      15.46 3.20  69.00    164.41     148.95

              110.550  17800.00        5.38      16.67 3.92  35.00    166.68     150.01

              112.000  17800.00        8.10      11.67 2.54  35.00    167.83     156.17
                                  Drop
  152+55      115.000  17800.00   struct. 7.21  12.93 2.75  69.00    169.39     156.47

              119.000  17800.00        6.47      14.23 2.97  69.00    171.09     156.87

              123.000  17800.00        6.04      15.09 3.13  69.00    172.36     157.27

              133.000  17800.00        5.55      16.23 3.34  35.00    174.       15  27

  end         143.000  17800.00        5.63      16.04 3.3   35.00    175.01     158.97
```

b =

1%
Ca

```
                                                            THIS RUN EXECUTED  1/ 6/8

**********************
UPDATED JULY1979

**********************

F CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST
```

b = 170' to b = 165'

1% Flood
Case 1,3,5,6

```
CH       DEPTH   F.B.  K*XNCH    CWSEL     ELMIN     XLBEL     RBEL     HELEV    HFT
4,82     16,35   3.34  63,00    152,50    136,15    151,55    151,85    155.8    19.
5,38     16,97   3.48  63,00    154,12    137,15    157,55    157,55    157.60   20.4
5,20     17,46   3.58  63,00    155,61    138,15    158,55    158,55    159.18   21.0
         17,90   3.66  63,00    157,      13  35    162,55    162,55    161.16   21.81
                                          1.35
4,91     18,07   3.69  63,00    158,22    140,15    163,35    163,35    161.91   21.76
4,62     19,02   3.87  63,00    161,17    142,15    165,35    165,35    165.04   22.8
4,76     19,00   3.87  63,00    162,15    143,15    166,55    166,55    166.02   22.87
4,64     18,98   3.86  35,00    162,43    143,45    166,85    166,85    166.29   22.84
6,13     14,91   3.09  35,00    163,47    148,56    167,56    167,56    166.57   18.01
6,12     14,93   3.10  69,00    163,58    148,65    167,65    167,65    166.68   18.03
5,88     15,46   3.20  69,00    164,41    148,95    167,95    167,95    167.61   18.66
5,38     16,67   3.92  35,00    166,68    150,01    169,01    169,01    170.1    20.10
8,10     11,67   2.54  35,00    167,83    156,17    225,15    175,17    170.4
7,21     12,93   2.75  69,00    169,39    156,47    175,47    175,47    172.14   15.67
6,47     14,23   2.97  69,00    171,09    156,87    175,87    175,87    174.07   17.20
6.04     15,09   3.13  69,00    172,36    157,27    176,27    176,27    175.49   18.22
         16,23   3.34  35,00    174,      15  27    177,27    177,27    177.24 ← incre
5,63     16,04   3.3   35,00    175,01    158,97    177,97    177,97    178.32   levee h.
                                                                                 1/2'
```

$FB = a(D + \frac{V^2}{})$

THIS RUN EXECUTED 1/ 6/81 10:26

b = 170' to b = 165'

ATES MESSAGE IN SUMMARY OF ERRORS LIST

1% Flood
Case 1,3,5,6

REVISED

CWSEL	ELMIN	XLBEL	RBEL	H_{ELEV}	H_{FT}	T	R/W	
152.50	136.15	151.55	151.85	155.8	19.69		367	use 375
154.12	137.15	157.55	157.55	157.60	20.45		370	
155.61	138.15	158.55	158.55	159.18	21.04		372	
	13 35 1.35	162.55	162.55	161.16	21.81		375	
158.22	140.15	163.35	163.35	161.91	21.76	257	375	
161.17	142.15	165.35	165.35	165.04	22.89	262	380	use 380
162.15	143.15	166.55	166.55	166.02	22.87	262	380	
162.43	143.45	166.85	166.85	166.29	22.84		379	
163.47	148.56	167.56	167.56	166.57	18.01		360	
163.58	148.65	167.65	167.65	166.68	18.03		360	
164.41	148.95	167.95	167.95	167.61	18.66		363	
166.68	150.01	169.01	169.01	170.1	20.10		368	
167.83	156.17	225.15	175.17	120.4				use 360
169.39	156.47	175.47	175.47	172.14	15.67		351	
171.09	156.87	175.87	175.87	174.07	17.20	234	352	3
[illegible]2.36	157.27	176.27	176.27	175.49	19.22	238	356	
	15 27	177.27	177.27	177.84 ← increase levee height ½'		245	364	
175.01	158.97	177.97	177.97	178.32				

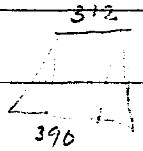
72
B.K.

REACH 2 Case 1,3,5,6

R/w requirements

at Station 22 R/w = 312 L = 200'
Sta 24 - Sta 112 R/w varies AVE ≈ 380 L = 8,800'
Sta 112 - Sta 143 R/w Varies Ave = 360 L = 3,100'

see HEC II Summary printout



TOTAL R/w = [312(200) + 78(200) + 390(8,800) + 360(3,100)] ÷ 435
= 104.8 Acres
of which 21.1 Ac. is creek bottom ← 11,495 × 80 ÷ 4356
83.7 Ac.

S.C.V.W.D FEE = 15.30 + 10.22 + 12.74
+ 2.96 + 0.386 + 4.00
+ 5.20 + 0.52 + 0.37
= 51.70

R/w to be purchased = 104.8 - 51.70 = 53.1
creek bottom to be purchased = 3.9 Ac
agricultural Land 49.20

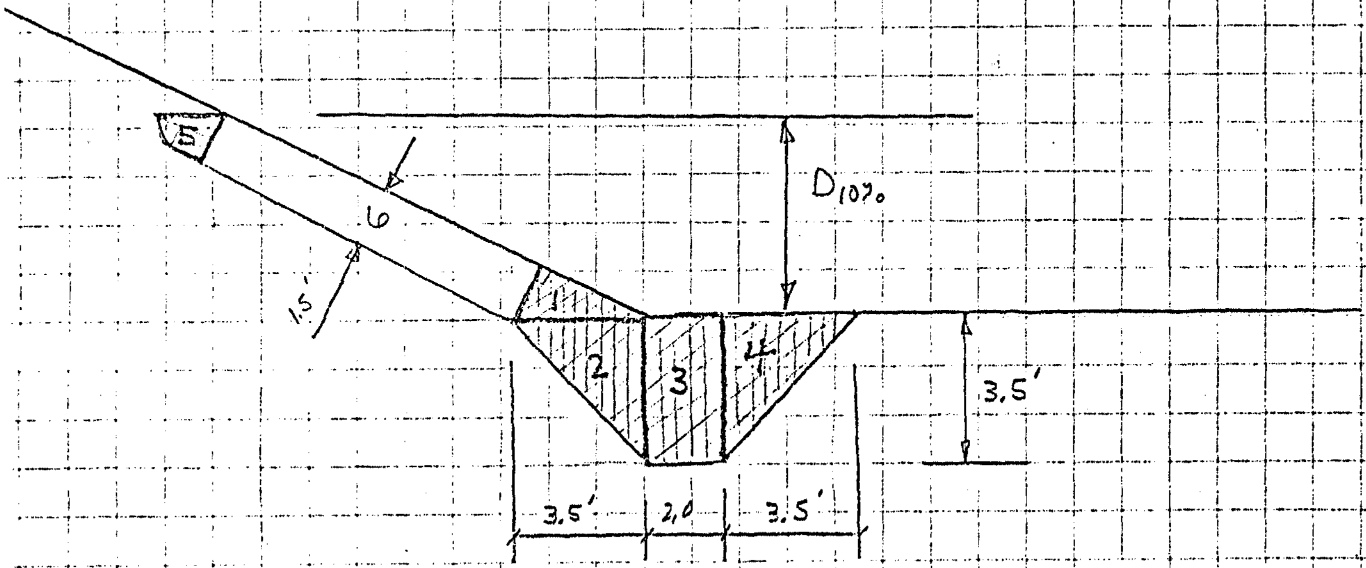
RIPRAP C[illegible]S.

E.K.
11/80

① determine $dn_{10\%}$ → Given: $Q_{10\%}$, b, S, n

S.f. of rock lining for one bank

$$= \left[\sqrt{(2)^2 d_{10\%}^2 + d_{10\%}^2}\right](1.5) + 22.87$$



① $A_1 = (3.16)(1.5)\frac{1}{2} = 2.37$ s.f.
② $A_2 = \frac{1}{2}(3.5)^2 = 6.13$ s.f.
③ $A_3 = (2.0)(3.5) = 7.00$ sf
④ $A_4 = \frac{1}{2}(3.5)^2 = 6.13$ sf
⑤ $A_5 = 1.24$ sf

22.87 s.f.

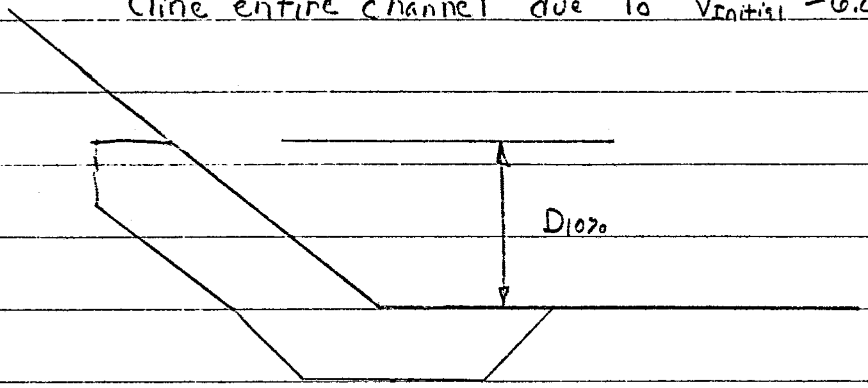
⑥ $A_6 = \left[\sqrt{2D_{10\%}^2 + D_{10\%}^2}\right]1.5$

Reach 2, case 1 & 3

rock lining to be provided along

sta 160+00 to sta 182+00

(line entire channel due to $V_{Initial} > 6.0$ fps.



$Q_{10\%} = 11,000$ c.f.s. , $n = 0.025$, $S = 0.001$

$$K' = \frac{Qn}{S^{1/2} b^{2/3}} = \frac{(11,000)(0.025)}{(0.001)^{1/2}\ (160)^{2/3}} = 0.0115$$

$d/b = 0.0521$ $\qquad d_n = 8.50$ ft

quantity of riprap $= \sqrt{(2)^2(8.5)^2 + 8.5^2}\ (1.5) + 22.87$

$= 51.38$ S.F. / bank

total quantity $= (51.38)(18200 - 6400)\frac{1}{27}$

$= 22,455$ S.F.

+ ~~quantity required for drop structure area & Channel bends~~

~~$= (1920)(51.38)\frac{1}{27} = 3,654$~~ (void) ⟹ included above

total $= 22,455$ Cu. Yd $=$ **22,455 cubic Yards**

+ / —)

LLAGAS CREEK - SELECTED DROP STRUCTURES

	W	B	L_S	L_B	D		CONCRETE (CU. YD)
17,000	70	70	15	100	6		1350.7
9,000	50	50	12	75	5		824.1
5,000	38	38	9	57	3		488.0
3,000	32	32	7	48	3		270.1
2,000	25	25	6	38	2		237.0
1,000	16	16	5.5	24	5		174.3

Reach two Case 1,3,5,6

drop structures at sta 96 : sta 112

For 1% Flood Case

$Q_{1\%} = 17,800$ CFS.

1508.1 Cubic yards of concrete required for each drop structure.

total Concrete needed = 3016.20 Cubic yards

Use 2 standard B drop from DMJM Chart at 50 cy for 17,800 cfs vs 17,000

∴ Vol = 1350+50 = 1400 cy per structure

Σ Vol = 1400 × 2 = 2800 cy

[illegible]

B.K.

REACh 2 case 1,3,5,6

Seeding :

area of Seeding which be to provided above the 10% Flood depth on one bank

49.19

$$= \left[(17)(900) + (.15.2)(4822)\right] \div 43560$$

$$+ \left[((13695 - 2200) \div 5722) \times 49.20\right] \div 43560$$

$$= 8.6 \text{ Ac.} + \overset{\text{noncohesive}}{(70)}(5{,}800) \div 43560 = \underline{31.2} \text{ AC}$$

$n = 0.063$: Sta 54+00 to Sta 63+00

$n = 0.065$ Sta 63+00 to Sta 95+82

$n = 0.069$ Sta 96+45 to Sta 111+22

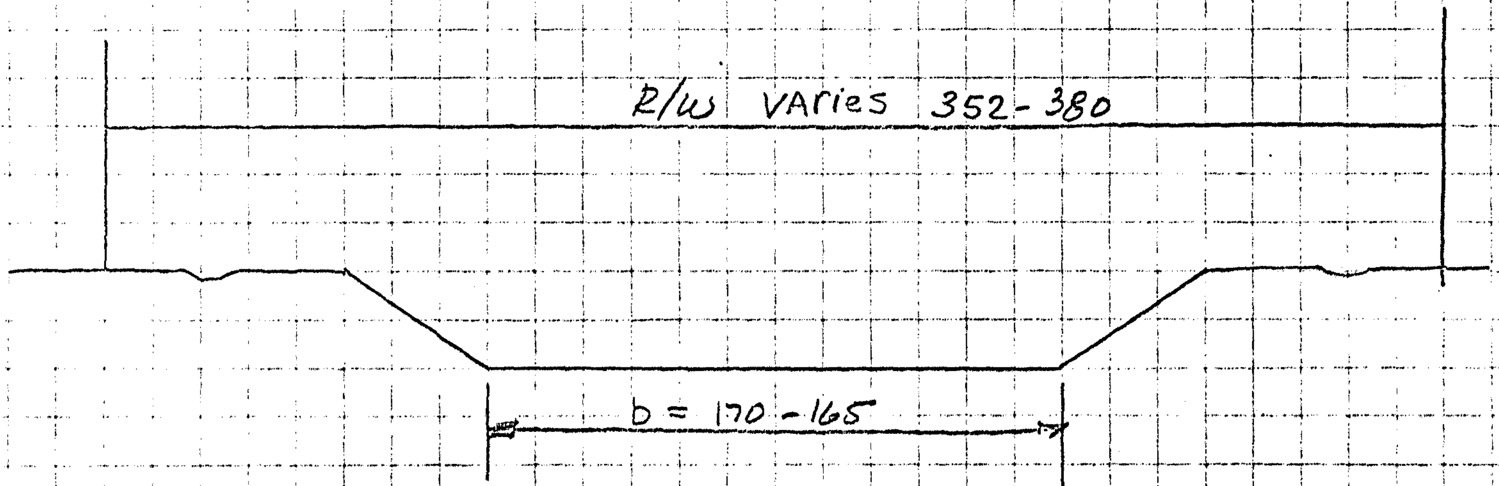
Farm bridge (1)

260 ft × 10 = 2600 s.f.

(1) State & County bridge

260 × 32 = 8320

REACH 2
Case 1, 3, 5, 6



B.K. Feb. 1
79

LLAGAS CREEK – REACH 2.

channel excavation calc's:

original earthwork = 1,057,821 cubic yards (From 1979 workplan

for

	length	b
Sta 64+00 - Sta 93+00	2900	140
93+00 - 121+00	2800	155
121+00 - 127+40	640	155
127+40 - 150+00	2260	150
150+00 - 160+00	1000	150
160+00 - 182+00	2200	150

Using detailed plans for Reach two
original excavation = 837,150 cu. yd. for b=160'

+ 91,467

928,617 cu. yd.

Exc. Channel length 137,200, additional 10' channel width
$137200 \times 10' \times 18'$ average $\times \frac{1}{27} = 91{,}467$ C.Y.

Channel excavation calc's:

orginal earthwork = 1,057,821 Cubic Yards

for	length	b
Sta 64+00 - Sta 93+00	2900	140
93+00 - 121+00	2800	155
121+00 - 127+40	640	155
127+40 - 150+00	2260	150
150+00 - 160+00	1000	150
160+00 - 182+00	2200	150

Using detailed plans for Reach two

original excavation = 837,150 cu. yd. for b=160'

$$\begin{array}{r} + \quad 91,467 \\ \hline 928,617 \end{array}$$ cu. yd.

EARTH QUANTITY ESTIMATE

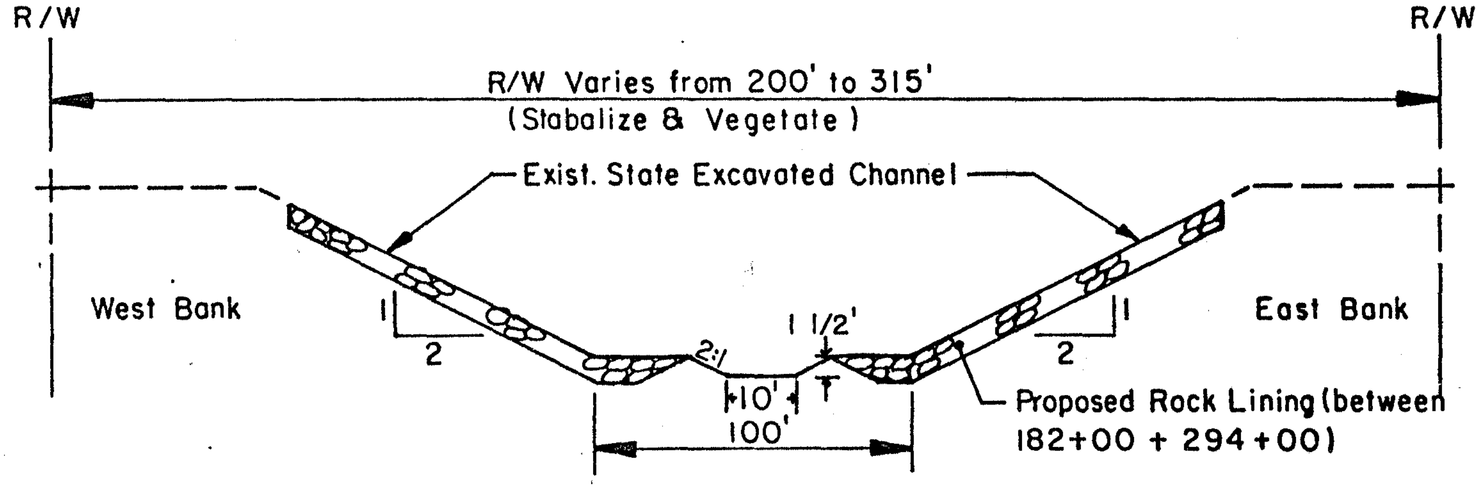
AREA							AVERAGE VOLUME				
	℄	CUT		FILL		NET	DIST	CUT	FILL	NET	RUN TOTA
		FT²	Yd²	FT²	Yd²	Yd²	Yd	Yd³	Yd³	Yd³	Yd
22 + 15	22 + 15	220	24	542	60	36 F					
							74	8917	5,735	3182 c	3182
24 + 38	24 + 38	1956	217	858	95	122 c					
							21	3,601	3,118	482 c	3,664
25 + 00	24 + 90	1130	136	1814	202	76 F					
							258	29,062	49,729	20,667 F	17,002
33 + 00	32 + 65	892	91	1650	182	82 F					
							401	46,917	68 771	21 854 F	38,85
45 + 00	44 + 70	1216	135	1446	160	25 F					
							300	45,300	46150	850 F	39,706
54 + 00	54 + 70	1500	167	1320	147	20 c					
54 + 00	54 + 70	1500	167	1476	164	3 c					
							133	23400	21280	2120 c	37586
30	57 + 70	1670	185	1410	156	29 c					
							133	25,735	18 221	7514 c	30,072
62 + 00	61 + 70	1820	202	1060	118	84 c					
62 + 00	61 + 70	1780	194	1220	136	58 c					
							297	73,953	30,026	43,926 c	13,854
71 + 00	70 + 60	2470	304	594	66	238 c					
							413	155,081	13,670	141,410 c	155,264
83 + 45	83 + 00	4000	447			447 c					
							120	52,560	1,560	51,000 c	206,264
87 + 00	86 + 60	3860	429	240	26	403 c					
							313	144 449	4382	140,067 c	346,331
18 + 40	96 + 00	4450	494			494 c					
18 + 40	96 + 00	2860	318	128	14	314 c					
							320	92160	2240	89920 c	436,251
[illegible] + 00	105 + 60	2320	258			258 c					
							208	68,536		68,536 c	504,787
14 + 15	111 + 85	3610	401			401 c					

		AREA					AVERAGE VOLUME				
	℄	CUT		FILL		NET	DIST	CUT	FILL	NET	RUN TOTAL
		FT²	Yd²	FT²	Yd²	Yd²	Yd	Yd³	Yd³	Yd³	Yd³
114 + 45	111+85	3,000	333	150	17	316c					
							188	61,570		61570c	566,367
119 + 85	117+50	2,900	322	154	17	305c					
							283	93,390	2405	90,984c	657,31
128 + 30	126+00	3040	338			338c					
							67	23,014		23014c	680,35
130 + 35	128+00	3140	349			349c					
130 + 35	128+00	3140	349			349c					
							53	19742		19742	700,09
132 + 00	129+60	3,560	396			396c					
							267	137,066		137,066c	837,143
140 + 00	137+60	4 624	514			514c					
								1,104,400	267,250		837,15

Reach 3

This reach extends from station 182+00 to 379+00 on Llagas Creek. Construction of the channel was done in 1972. The proposed work is to stabilize the bottom and sides. Rock riprap is proposed for the side slopes on the lower two miles. Three drops will be constructed incorporating fish ladders. A low flow channel will also be incorporated to assure fish migration. The bridges at Gilman and Leavesley Roads will be replaced.

MAIN BRANCH LLAGAS CREEK


R/W
R/W
R/W Varies from 200' to 315'
(Stabalize & Vegetate)
Exist. State Excavated Channel
West Bank
East Bank
1
2
2:1
1 1/2'
1
2
10'
100'
Proposed Rock Lining (between 182+00 + 294+00)

STA 182+00 (Rte. 152) To STA 379+00 (Buena Vista Ave.)

RTE. 152 TO BUENA VISTA AVE.

REACH 3

FIGURE 4

LLAGAS CREEK – No Flood Control Work (Existing)

Alternative 1 Calculations

Reach 3

Drop structions (~~4~~ 3 Drop structures)

Use 3 drops vice 2
Use same Concrete Vol
drop at 196+00 d=13' drops
at 182+00 & 196+00 d = 6½
OK
JZH
7/22/81

Sta 182+00 824 CY of concrete X 350 = $288,4
Sta 196+00 824 CY of concrete X $350 = $288,4
Sta 299+00 824 CY " " X $350 = $288,4
Sta 376+00 824 CY " " X $350 = $288,4
Sta 3
Average velocity = 7.62 fps (Q = 8,347 cfs).

Assume Rock riprap will be used
to stabilize the bank.
From Alt. 2 cal. 37,930 C.Y. of rock
will be required.
37,930 × $40/CY = $1,517,200 1,517,

Total construction Costs 2670,
15% Contigency including 3%
~~for revegetation~~ 4006
Total Costs $3071,4

[illegible]

3% Contengency
Vegetation
Erosion planting 13.6 ac @ $1000/ac = 13,600
Irrigated Riparian 7 ac @ $3,770/ac = 26,400

40,000

Pilot Channel
d = 1.5
ss = 2:1
b = 10
l = 19200'
Cost = $2.80/cy

$$Vol = \frac{bd + zd^2}{27}(l)$$

$$= \frac{10(1.5) + 2(1.5)^2}{27}(19{,}200)$$

$$= 13{,}870\ cy$$

Cost = 13,870 (2.80) = 38 38,800

78,800

.03(2,670,800) = $80,124
Use $80,124 above

LLAGAS CREEK – REACH 3, 9, 14, 5

4/10/78
Ty

Alternative 1 Summary

Reach 3

Elements
1) 4 Drop structures
2) 38,000 C.Y of rock riprap
Rock riprap

3) Revegetation
4) 2 Bridges

~~Total construction cost~~ $3,071,420 ddH
+ 516 096 bridges
3,581,516

~~Reach 9~~

Riprap

38,000 cy includes 35,800cy to armor sides and around bridges
plus 2200 to riprap channel bottom upstream and downstream at each of 4 drops

b = 100'
t = 2'
l = 35'

$$V_0 = \frac{100(2)}{27}(2)(35)(4) = \underline{\underline{2075}}\text{ cy}$$

ddH 6/25/81

Calif
LL Hansen 8/11/81
Previous Work

Lower Llagas

from SCVWD
R/W 871 acres $385,000

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 3 ~~7B~~ 90

revised

Item	Quantity	Unit Cost	$
State and County Bridges	10,048	45	452,160
Private Bridges			
Barbed Wire Fence			
Relocation of Utilities			

Void

Subtotal 452,160

~~15~~12% Contingency 54,259

TOTAL 506,419

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom			0
Agricultural			
Potential Residential (low value)			
Potential Residential (medium value)			
Residential/School			
Landscaping Addition			

TOTAL

Calif
LL Hansen 7/23/81
Reach 3
Cost Summary
Drop Structures

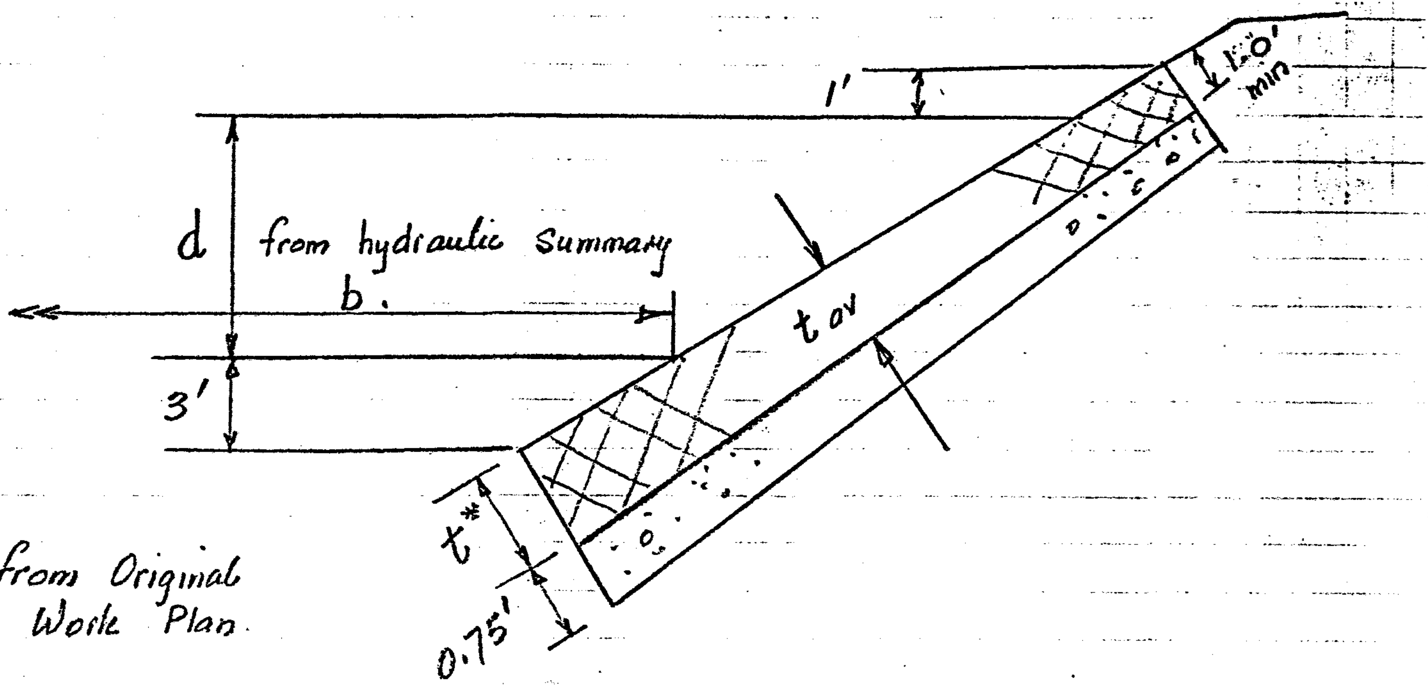
Lower Llagas Creek

Since Q ≈ 8100cfs and volume taken from 9000cfs
can decrease Volume by 7cy/structure

Sta			
196	1641	@350	574 350
279	817	@350	285 950
379	817	@350	285 950
			$1,146,250

Rock	37,930 @ 40	1,517,200
Veg		40,000
Excavation		38,800
		2,742,250
Contengency	12%	329,070
		3,071,320

RIPRAP QUANTITIES	JOB No.	SHEET No.
	DESIGNED BY	DATE
SELECTED PLAN.	APPROVED	



*from Original Work Plan.

Rip Rap – Non Cohesive Reaches

Per. lin. ft. channel = $2\sqrt{5}\,(d+4) \times t_{av}$ cu. ft.

Use original work plan values of "t" in feet.

RipRap – Cohesive Reaches.

Use original work plan stationing & thickness.
Use revised design values for d.

Filter Stone 0.75' thick

Use $\frac{0.75}{t_{av}}$ × Rip Rap Quantities.

DMJM
DANIEL, MANN, JOHNSON, & MENDENHALL
PLANNING • ARCHITECTURE • ENGINEERING • SYSTEMS • ECONOMICS

RIP RAP QUANTITIES.

SELECTED PLAN.

JOB NO. 6209-1-1
DESIGNED BY M.S.
APPROVED
SHEET NO. 1 OF 3
DATE JUNE 8 '76

REACH No.	STATION BEGIN	STATION END	SOIL TYPE	L	d	$2\sqrt{5}(d+4)$	t	t_{av}	RIP RAP (cu yd)	$\frac{0.75}{t_{av}}$	FILTER STONE (cu. yd.)	
	LOWER LLAGAS CREEK											
2	128+25	129+00	C	75	15	84.97	2	1.5	354	0.5	177	
	149+25	150+00	C	75	15	84.97	2	1.5	354	0.5	177	
	150+00	160+00	C	1000	15	84.97	1	1	3,147	0.75	2,360	
	160+00	181+25	N.C.	2125	15	84.97	1	1	6,687	0.75	5,015	
	181+25	182+00	N.C.	75	15	84.97	2	1.5	9,559	0.5	4,780	
									20,101		12,509	
3	182+00	193+42	N.C.	1142	17.5	87.21 ~~93.91~~	1	1	~~3,972~~ 3,687	0.75	~~2,979~~	2,767
	193+42	194+17	N.C.	75	~~12~~ 11.44	69.21 ~~71.55~~	2	1.5	~~298~~ 339	0.5	~~149~~	170
	194+17	229+25	N.C.	3508	~~12~~ 11.44	[illegible] ~~71.55~~	1	1	~~9,296~~ 10,575	0.75	1 ~~6,972~~	7,931
	229+25	230+00	N.C.	75	~~12~~ 11.46	~~71.55~~	2	1.5	~~298~~ 339	0.5	~~149~~	170
	230+00	259+25	N.C.	2925	12 11.42	69.21 ~~71.55~~	1	1	~~7,751~~ 8,817	0.75	~~5,813~~	6,612
	259+25	260+00	N.C.	75	~~12~~ 11.44	69.23 ~~71.53~~	2	1.5	~~298~~ 339	0.5	~~149~~	170
	260+00	293+25	N.C.	3325	~~12~~ 11.4[illegible]	69.2[illegible] ~~71.55~~	1	1	8,811 10,023	0.75	~~6,608~~	7,517
	293+25	294+00	N.C.	75	12 11.44	69.29 ~~71.55~~	2	1.5	~~298~~ 339	0.5	~~149~~	170
	294+00	298+15	C	415	~~12~~ 11.5	69.32 ~~71.55~~	1	1	~~1100~~ 1065	0.75	~~825~~	799
	298+15	298+90	C	75	12 11.5	69.32 ~~71.55~~	2	1.5	~~298~~ 289	0.5	~~149~~	144
									~~32,420~~ 35,914		~~23,942~~	26,450
4	385+25	386+00	C	75	~~12~~ 11.1	67.53 ~~71.55~~	2	1.5	~~298~~ 281	0.5	~~149~~	141
	386+00	419+25	N.C	3325	~~12~~ 11.5	69.32 ~~71.55~~	1.25	1.13	~~9,957~~ 9646	0.66	~~6,584~~	6,366
	419+25	420+00	N.C.	75	~~12~~ 11.5	69.32 ~~71.55~~	2	1.5	~~298~~ 289	0.5	~~149~~	145
	420+00	441+00	N.C.	2100	14	80.50	1.25	1.13	7,075	0.66	4,670	
	441+00	458+00	N.C.	1700	~~10~~ 11.3	69.03 ~~62.61~~	1.5	1.25	~~4,928~~ 5,575	0.60	~~2,957~~	3,345
	458+00	497+40	N.C.	3940	~~10~~ 11.3	67.23 ~~62.61~~	1.58	1.29	~~11,785~~ 11,112	0.58	~~6,835~~	6,445
	497+40	498+15	N.C.	75	~~10~~ 11.5	69.03 ~~62.61~~	2	1.5	~~261~~ 245	0.5	~~131~~	123
									~~34,602~~ 37,223		~~21,475~~	21,235

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 3 Case 7B case 9D

Item	Quantity	Unit Cost	$
Channel Excavation			
~~Compacted~~ Levee Embankment	5760 C.Y.	$2.25 C.Y.	12,960
Drop Structures			
Drainage Inlets			
Riprap			
F[illegible]er Stone			
S[illegible]ing			
Landscaping	No landscaping		
Structural Excavation			
Rectangular Concrete Channel			
Compacted Backfill			
Levee Embankment			
Site ~~Preparation~~ Clear (Levees)	2.94 Ac	350	1,029
Mobilization		6%	839

Subtotal 14,828

~~15%~~ 10 12 Contingency 1,779

TOTAL 16,607

2-17-8

Y94

LLAGAS CREEK — Reach 3

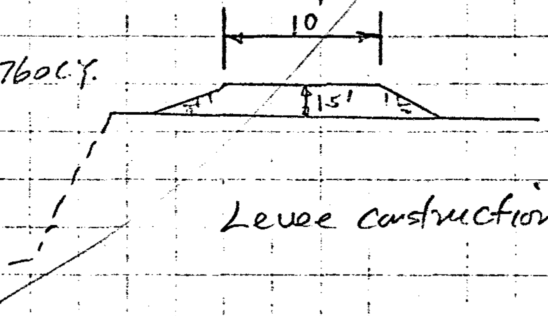
Items of work to be done in Reach 3

1) Replace Bridges at Gilman Rd and Leavesly Ave
sta 238+00, sta 294+00.

~~2) 4000± l.f of Levee (max 1.5')~~

Levee Embankment.

0.72 C.Y/l.f X 4000 X 2 = 5760 C.Y.



Levee construction

Clearing 16' X 4000 X 2 X $\frac{1}{43560}$ = 2.94 Ac.

Bridges
sta 294+00 166' X 32 = 5312 S.F
sta 238+00 148 X 32 = 4736
10048

Revised
Void

LLAGAS Creek – REACH 3

TY
April 19

Bridge to be replaced at Gilman Rd & Leavesley

Sta 144+10 Gilman 154' x 32' = 4928

Leavesley Ave 166 X 32 = 5312
10,240 S.F

10,240 S.F @ $45/S.F = 460,800
12% Contingency 55296
$516,096 ok

~~See Alternative E for Hydraulics Cal.~~

By. B.K.

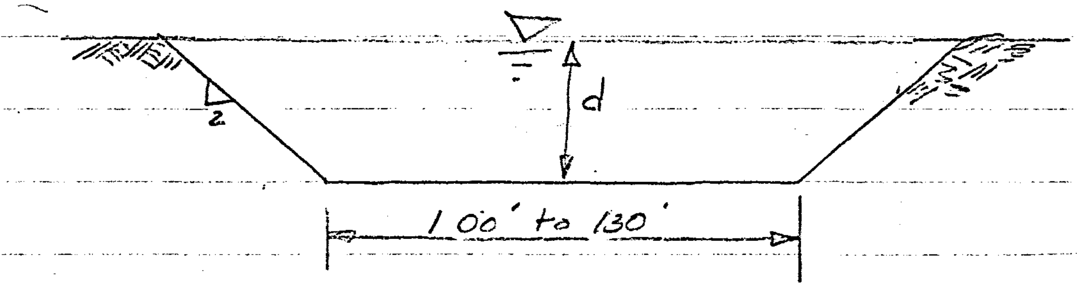
Reach 3 Chock State Excavated channel Capacity

d	S	Q	A	V	
10	0.0016	8347	1200	6.9	Sta 182+00 ↓ Sta 298+90
11	0.0016	9849	1342	7.3	
12	0.0014	11,474	1488	7.7	
13	0.0016	13,222	1638	8.1	
12	0.0012	9,937	1488	6.7	Sta 298+90 ↓ Sta 376+00
13	0.0012	11,451	1638	7.0	
14	0.0012	13,050	1792	7.3	

Reach 3

existing Channel Capacity for
Llagas Creek
Sta 182+00 to Sta 379+00

Sta 182+00 - Sta 196+17 $S=0.0008$
Sta 196+17 - Sta 298+90 $S=.0016$
Sta 298+90 - Sta 376+00 $S=0.0012$



$d=10$ $d/b = {}^{10}/_{100} = 0.10$

$K' = 0.0339$

$$Q = 0.0339 \frac{b^{8/3} S^{1/2}}{n} = 0.0339 \frac{(100)^{8/3} (.0016)^{1/2}}{0.035} = 8,347 \text{ c.f.s.}$$

$d=11$ $d/b = {}^{11}/_{100} = 0.11$

$K' = 0.04$

$$Q = 0.04 \frac{(100)^{8/3} (.0016)^{1/2}}{0.035} = 9,849 \text{ C.f.S.}$$

$d = 12$ $d/b = 12/100 = 0.12$

$K' = .0466$

$$Q = .0466 \frac{(100)^{8/3}(.0016)^{1/2}}{0.035} = 11{,}474 \text{ cfs}$$

$d = 13$ $d/b = 13/100 = 0.13$

$K' = 0.0537$

$$Q = 0.0537 \frac{(100)^{8/3}(0.0016)^{1/2}}{0.035} = 13{,}222 \text{ cfs}$$

$d = 12'$ $d/b = 12/100 = 0.12$

$K' = .0466$

$$Q = .0466 \frac{(100)^{8/3}(0.0012)^{1/2}}{0.035} = 9{,}937 \text{ cfs}$$

$d = 13'$ $d/b = 13/100 = 0.13$

$K' = 0.0537$

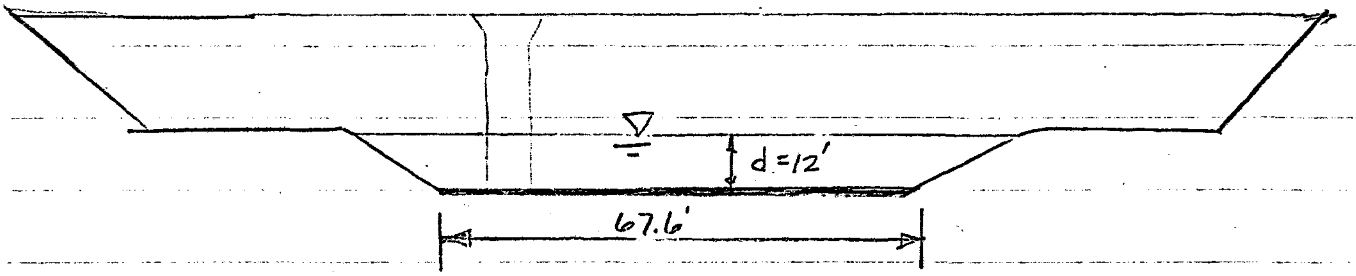
$$Q = 0.0537 \frac{(100)^{8/3}(0.0012)^{1/2}}{0.035} = 11{,}451 \text{ c.f.s.}$$

$d = 14$ $d/b = 14/100 = .14$

$K' = .0612$

$$Q = .0612 \frac{(100)^{8/3}(0.0012)^{1/2}}{0.035} = 13{,}050 \text{ c.f.s.}$$

6th Street Channel capacity



d = 6 $d/b = 12/67.6 = 0.1775$

$K' = 0.0937$

$$Q = 0.0937 \frac{(b)^{8/3}(S)^{1/2}}{n}$$

$$= 0.0937 \frac{(67.6)^{8/3}(0.0013)^{1/2}}{0.035} = 7{,}320 \text{ c.f.s.}$$

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif	PROJECT Lower Llagas		
Y L L Hansen	DATE 7/24/81	CHECKED BY	DATE	JOB NO.
IBJECT Reach 3			SHEET ____ OF ____

Sta 182+00 – 190+80

Aged = As Built

```
WP PROG    17
    DATA
     8100.        Q1
      100.         B
        2.         Z
    0.0008         S
     0.035         N

   OUTPUT
       12.         D
      148.         T
     1488.         A
9.683362414        R
8118.008106       Q2
5.455650609        V
 Q1/Q2 RATIO
.9977817088
     END
```

190+80 – 294+00

Aged = As Built

```
WP PROG    17
    DATA
     8100.        Q1
      100.         B
        2.         Z
    0.0016         S
     0.035         N

   OUTPUT
       9.8         D
     139.2         T
   1172.08         A
8.149238677        R
8060.822726       Q2
6.877365646        V
 Q1/Q2 RATIO
1.004860208
     END
```

294+00 – 379+00

Aged = As Built

```
WP PROG    17
    DATA
     7900.        Q1
      100.         B
        2.         Z
    0.0012         S
     0.035         N

   OUTPUT
      10.5         D
      142.         T
    1270.5         A
8.645360914        R
 7871.14917       Q2
6.195316151        V
 Q1/Q2 RATIO
 1.00366539
     END
```

Near Pacheco Pass Hwy

Sta 181+95 to Sta 185+66 (L = 371)

$b = 135$ $S = 0.0009$

Sta 185+66 to Sta 188+76 (L = 310)

$b = 130$ $S = 0.0008$

$d/b = 18.5/135 = 0.1370$

$K' = 0.059$

$Q = 0.059 \dfrac{b^{8/3} S^{1/2}}{n} = 0.059 \dfrac{(135)^{8/3}(0.0009)^{1/2}}{0.035} = 24,255$ c.f.s.

$d/b = 15/135 = 0.111$ $K' = .04$ $Q = 16,444$

$d/b = 20.5/130 = 0.1577$

$K' = 0.0757$

$Q = 0.0757 \dfrac{b^{8/3} S^{1/2}}{n} = 0.0757 \dfrac{(130)^{8/3}(0.0008)^{1/2}}{0.035}$

$= 26,531$ c.f.s.

2/11/81
Ty

LLAGAS CREEK - REACH 3

Check Hydraulics at the confluence of Reach 2, 3, 4
check Dc at sta 196+17

Design channel for the full capacity w/no freeboard.

$Q = 8347 \quad b = 100'$ $\quad K'_c = \frac{Q}{b^{5/2}} = \frac{8347}{100000} = .083$ $\quad Q = 8347$

$\frac{D_c}{b} = .06 \quad D_c = 6'$

$Q = 11474 \quad K'_c = \frac{Q}{b^{5/2}} = \frac{11474}{100,000} = .115$

$\frac{D_c}{b} = .07 \quad D_c = 7$

$Q = 13222 \quad K'_c = \frac{Q}{b^{5/2}} = \frac{13222}{100000} = .132$

$\frac{D_c}{b} = .08 \quad D_c = 8'$

$Q = 9849 \quad K'_c = \frac{Q}{100,000} = \frac{9849}{100,000} = .098$

$\frac{D_c}{b} = .065 \quad D_c = 6.5$

$Q = 6500 \text{ cfs} \quad K'_c = \frac{Q}{b^{5/2}} = \frac{6500}{100,000} = .065$

$\frac{D_c}{b} = .05 \quad D_c = 5$

The existing channel has the capacity of 8347cfs. From Se
profiles, it should be no problem. The slide profile indicated
that Levee may be required in some area.

```
                                                       Q            V
1  1  1   100.00 2.00 2.00        .00 176.30   .00   8347 .0349   6.00    5.76   672.00   12.42
      1   100.00 2.00 2.00     300.00 176.78   .00   8347 .0349   8.63    5.76  1012.60    8.24
      1   100.00 2.00 2.00     300.00 177.26   .00   8347 .0349   8.98    5.76  1060.33    7.87
      1   100.00 2.00 2.00     300.00 177.74   .00   8347 .0349   9.22    5.76  1092.41    7.64
      1   100.00 2.00 2.00     300.00 178.22   .00   8347 .0349   9.39    5.76  1115.47    7.48
      1   100.00 2.00 2.00     300.00 178.70   .00   8347 .0349   9.51    5.76  1132.67    7.36
      1   100.00 2.00 2.00     300.00 179.18   .00   8347 .0349   9.61    5.76  1145.81    7.28
      1   100.00 2.00 2.00    7835.00 194.30   .00   8347 .0349   9.36    5.76  1112.29    7.50  296+70
```

Some levee may be required.

```
                                                   Qb            Vb
1  1    100.00 2.00 2.00        .00 176.30   .00 ~~9849~~ .0349 ~~6.50~~  6.41   734.50   13.40
   1  100.00 2.00 2.00    300.00 176.78  .00  9849 .0349  9.48  6.41 1128.84    8.72
   1  100.00 2.00 2.00    300.00 177.26  .00  9849 .0349  9.85  6.41 1179.51    8.35
   1  100.00 2.00 2.00    300.00 177.74  .00  9849 .0349 10.10  6.41 1214.43    8.10
   1  100.00 2.00 2.00    300.00 178.22  .00  9849 .0349 10.28  6.41 1240.00    7.94
   1  100.00 2.00 2.00    300.00 178.70  .00  9849 .0349 10.42  6.41 1259.40    7.82
   1  100.00 2.00 2.00    300.00 179.18  .00  9849 .0349 10.52  6.41 1274.45    7.72
   1  100.00 2.00 2.00   7835.00 194.30  .00  9849 .0349 10.32  6.41 1246.27    7.90
```

Levee is required

overtopping

Computi
Up St.
Dn. St. ____

STANDARD STEP METHOD

WANG

Project ______ Name ______ Date ____

(1) X	(2) I	(3) b	(4) Z_R	(5) Z_L	(6) ΔX	(7) El	(8) C	(9) Q	(10) n	(11) y	(12) $\frac{A^3}{T}-\frac{Q^2}{g}$	(1
1	1	100	2	2	0	176.3	0	8749	.035	6.5		
0	0	100	2	2	300	176.78	0					
0	0	100	2	2	300	177.26						
0	0	100	2	2	300	177.74						
0	0	100	2	2	300	178.22						
0	0	100	2	2	300	178.7						
0	0	100	2	2	300	179.18						
0	0	100	2	2	7835	194.30						

TABLE 3A - STRUCTURE DATA

CHANNELS
Lower Llagas Creek Watershed, California

Channel Designation Station to Station	Channel Reach	Watershed Area 1/ (sq. miles)	Design Channel Capacity (cfs.)	Bottom Width (ft.)	Depth of Water 5/ (ft.)	Channel Gradient (ft./ft.)	Design Velocity (ft./sec.)
LLAGAS CREEK							
0+00 to 30+00	L-1	99.5	10,000 2/	150	9.3	.0010	6.4
30+00 to 47+50	L-1	99.5	14,300 3/	150	11.5	.0010	7.2
47+50 to 93+40	L-1	84.4	13,900 4/	120	12.8	.0010	7.5
93+40 to 121+00	L-1	84.4	16,100	120	13.9	.0010	7.9
121+00 to 129+00	L-1	84.4	16,100	120	13.9	.0010	7.9
129+00 to 150+00	L-1	84.4	16,100	120	13.9	.0010	7.9
150+00 to 191+00	L-1	84.4	16,100	130	15.0	.0009	6.7
191+00 to 298+90	L-1,L-2	61.7	9,300	100	10.6	.0016	7.2
298+90 to 357+50	L-2	61.7	9,300	100	10.5	.0012	7.3
357+50 to 386+00	L-2	61.7	9,300	100	10.5	.0012	7.3
386+00 to 420+00	L-2	58.9	8,900	99	12.0	.0010	6.0
420+00 to 441+00	L-2	58.9	8,900	122	11.0	.0009	5.6
441+00 to 458+00	L-2	58.9	8,900	111	8.0	.0031	8.8
MILLER SLOUGH							
"A" Line							
0+00 to 55+00	R-1	18.3	5,200	50	11.6	.0009	6.1
55+00 to 182+00	R-1	13.3	4,200	46	9.8	.0013	6.6
182+00 to 211+00	R-1	4.6	2,000	24	8.0	.0017	6.3
211+00 to 250+00	R-1	2.4	1,150	35	4.1	.0035	6.6
250+00 to 285+00	R-1	1.9	800	23	4.1	.0035	6.3
"B" Line							
182+00 to 226+00	R-2	6.6	2,900	44	7.2	.0020	6.9
226+00 to 297+00	R-2	6.1	2,700	40	7.2	.0020	6.8
"C" Line							
211+00 to 217+00	R-2	1.9	900	8	7.2	.0020	5.6
217+00 to 233+00	R-2	1.3	630	8	5.6	.0030	5.8
"D" Line							
217+00 to 230+00	R-2	0.6	200	8	3.5	.0020	3.8
230+00 to 245+00	R-2	0.6	200	8	2.8	.0052	5.4

1/ Areas tributary to Llagas Creek includes the area of the Upper Llagas Creek Watershed
2/ 10 percent discharge
3/ 4 percent discharge
4/ 2 percent discharge
5/ Depth associated with design flows

September 1967

TABLE 4A
STRUCTURE DATA

CHANNELS
Lower Llagas Creek Watershed, California

Channel Designation Station to Station	Drawing No.	Watershed Area 1/ (sq. miles)	Design Channel Capacity (cfs.)	Bottom Width (ft.)	Depth of Water 5/ (ft.)	Channel Gradient (ft./ft.)	Design Velocity (ft./sec.)
LLAGAS CREEK							
0+00 to 30+00	L-1	99.5	10,000 2/	150	9.3	.0010	6.4
30+00 to 47+50	L-1	99.5	14,300 3/	150	11.5	.0010	7.2
47+50 to 93+40	L-1	84.4	13,900 4/	120	12.8	.0010	7.5
93+40 to 121+00	L-1	84.4	16,100	120	14.3	.0010	7.6
121+00 to 129+00	L-1	84.4	16,100	120	14.3	.0010	7.6
129+00 to 150+00	L-1	84.4	16,100	120	13.9	.0010	7.8
150+00 to 191+00 riprap 12,500cy	L-1	84.4	16,100	130	15.0	.0009	6.7
191+00 to 298+00 riprap 31,100cy	L-1, L-2	61.7	9,300 3/1	100	10.6	.0016	7.2
298+00 to 357+50	L-2	61.7	9,300	100 -	10.5	.0012	7.3
357+50 to 386+00	L-2	61.7	9,300	100	10.5	.0012	7.3
386+00 to 420+00 riprap	L-2	58.9	8,900	99	12.0	.0010	5.0
420+00 to 441+00 riprap 20,800cy	L-2	58.9	8,900	122	11.0	.0009	5.6
441+00 to 458+00 riprap	L-2	58.9	8,900	111	8.0	.0031	8.8
	64,400 cy @ $8 $515,200	64,400 @ $30 $1,932,000					
MILLER SLOUGH							
"A" Line							
0+00 to 55+00 West Br. Llagas Cr.	R-1	18.3	5,200	50	11.6	.0009	6.1 ✓
55+00 to 182+00	R-1	13.3	4,200	46	9.8	.0013	6.6
182+00 to 211+00	R-1	4.6	2,000	24	8.0	.0017	6.3 ←
211+00 to 250+00	R-1	2.4	1,150	35	4.1	.0035	6.6
250+00 to 285+00	R-1	1.9	800	23	4.1	.0035	6.3
"B" Line							
182+00 to 226+00	R-2	6.6	2,900	44	7.2	.0020	6.9
226+00 to 297+00	R-2	6.1	2,700	40	7.2	.0020	6.8
"C" Line							
211+00 to 217+00	R-2	1.9	900	8	7.2	.0020	5.6
217+00 to 233+00	R-2	1.3	630	8	5.6	.0030	5.8
"D" Line							
217+00 to 230+00	R-2	0.6	200	8	3.5	.0020	3.8
230+00 to 245+00	R-2	0.6	200	8	2.8	.0052	5.4

1/ Areas tributary to Llagas Creek include the area of the Upper Llagas Creek Watershed.
2/ 10 percent discharge
3/ 4 percent discharge
4/ 2 percent discharge
5/ Depth associated with design flows

February, 1966

TABLE 5A

STRUCTURE DATA

GRADE STABILIZATION STRUCTURES

Lower Llagas Creek Watershed, California

Location (Station)	Type of Structure	Drop (feet)	Spillway width (feet)	Depth of water up-stream (feet)	Concrete (c.y.)
Llagas Creek					
129 + 00	Modified Trapezoidal	6.1	92	13.9	358
150 + 00	Mod. Trap.	8.5	84	15.0	470
191 + 50	Mod. Trap.	10.4	78	10.6	432
298 + 90	Mod. Trap.	4.0	79	10.5	230
386 + 00	Mod. Trap.	4.0	67	12.0	264
420 + 00	Mod. Trap.	6.1	74	11.0	302
Miller Slough					
"A" 55 + 00	Type C	8.1	63	9.7	281
"A" 58 + 00	1/	4.0	--	4.0 2/	30
"B"184 + 00	Type C	5.6	54	7.2	171
"B"252 + 00	Type C	6.4	78	7.2	231

1/ Trapezoidal concrete chute confluence structure in Old Miller Slough at entrance into new channel.

2/ Depth in Old Miller Slough

February 1966

TABLE 7A

LOWER LLAGAS CREEK WATERSHED PROJECT

New Bridges - Physical Data

Channel Station	Bridge Type	Dimensions Length Ft.	Dimensions Width Ft.	Total Installation Cost Dollars
Llagas Creek				
47 + 50	County	220	32	121,400
85 + 00	Private	182	10	16,700
127 + 40	Private	178	10	16,400
182 + 00	State	190	32	104,900
186 + 50	Private	190	10	17,500
238 + 00	County	142	32	78,400
294 + 00	County	142	32	78,400
Miller Slough				
"A" 58 + 00	County	85	32	46,900
"A" 115 + 00	County	85	32	46,900
"A" 147 + 00	County	85	32	46,900
"A" 170 + 00	State	85	100	146,500
"A" 169 + 00	Railroad	85	Single Track	29,300
"A" 192 + 00	County	58	32	32,000
"A" 206 + 00	County	56	32	30,900
"A" 250 + 00	County	39	32	21,500
"B" 193 + 00	County	73	32	40,300
"B" 220 + 00	County	73	32	40,300
"B" 296 + 20	County	69	32	38,100
"C" 232 + 50	County	34	32	18,800
"D" 244 + 00	County	19	32	10,500

269,000

February 1966

TABLE 8A
CHANNEL DESIGN SUMMARY

COHESIVE SOILS

Reach	PI	Ta (lb/sq.ft)	d (ft.)	s (ft./ft.)	b (ft.)	b/d (ft./ft.)	wds (lb/ft.^{2})
LOWER LLAGAS CREEK WATERSHED							
Llagas Creek							
0+00 to 30+00	22	0.87	9.3	0.0010	150	16.1	0.58
30+00 to 47+50	22	0.87	11.5	0.0010	150	13.1	0.72
47+50 to 93+40	22	0.87	12.8	0.0010	120	9.4	0.80
93+40 to 121+00	22	0.87	13.9	0.0010	120	8.6	0.86
121+00 to 129+00	22	0.87	13.9	0.0010	120	8.6	0.86
129+00 to 150+00	22	0.87	13.9	0.0010	120	8.6	0.86
298+90 to 357+50	17	0.81	10.5	0.0012	100	9.5	0.79
357+50 to 386+00	15	0.79	10.5	0.0012	100	9.5	0.79
"A" Line							
0+00 to 55+00	15	0.79	11.6	0.0009	50	4.3	0.65
55+00 to 182+00	13	0.76	9.8	0.0013	46	4.7	0.78
182+00 to 211+00	19	0.85	8.0	0.0017	24	3.0	0.80
211+00 to 250+00	23	0.90	4.1	0.0035	35	8.5	0.89
250+00 to 285+00	23	0.90	4.1	0.0035	23	8.5	0.89
"B" Line							
182+00 to 226+00	23	0.90	7.2	0.0020	44	6.1	0.89
226+00 to 297+00	24	0.90	7.2	0.0020	40	5.5	0.90
"C" Line							
211+00 to 217+00	19	0.85	7.2	0.0020	8	1.1	0.70
217+00 to 233+00	19	0.85	5.6	0.0030	8	1.4	0.87
"D" Line							
217+00 to 245+00	19	0.85	2.8	0.0052	8	2.9	0.84

TABLE 9

CHANNEL DESIGN SUMMARY

NON-COHESIVE SOILS

.each	D_{75} (inches)	Ta (lb/sq.ft.)	V* (ft./sec.)	R'S (ft.)	S (ft./ft.)	R' (ft.)	Va $= 5.75 V_* \log\left(12.27 \frac{R'}{D_{75}}\right)$ (ft/sec.)	d (ft.)	b (ft.)	Vm (ft./sec)	~~wRS~~ wR'S (lb/sq.ft.)
r Llagas c Watershed											
as Creek											
00 to 191+00	0.75	0.30	0.393	0.0043 6	0.0009	5.33	6.8	15.0	130	6.7	0.30
00 to 298+90	1.00	0.40	0.456	0.0065	0.0016	4.06	7.3	10.6	100	7.2	0.40
·00 to 420+00	1.25	0.50	0.352	0.0039	0.0010	3.85	6.0	12.0	99	6.0	0.24
·00 to 441+00	0.50	0.20	0.328	0.0033	0.0009	3.71	5.7	11.0	122	5.6	0.20
·00 to 458+00	2.60	1.04	0.730	0.0164	0.0031	5.30	10.4	8.0	111	8.8	1.06
ɔr Llagas ɛk Watershed											
gas Creek											
+00 to 498+15	2.60	1.04	0.730	0.0164	0.0031	5.30	10.4	8.0	111	8.8	1.06
+15 to 513+00	1.50	0.60	0.560	0.0097	0.0030	3.23	8.0	8.0	60	8.0	0.60
+00 to 580+00	2.00	0.80	0.645	0.0129	0.0026	4.97	9.5	7.0	85	7.0	0.80
+00 to 687+00	2.00	0.80	0.645	0.0129	0.0030	4.30	9.3	7.0	78	7.5	0.80
'+00 to 703+70	2.00	0.80	0.645	0.0129	0.0042	3.08	8.7	7.0	65	8.8	0.80
+70 to 735+00	2.00	0.80	0.645	0.0129	0.0045	2.87	8.6	7.0	42	8.7	0.80
ɔer Little agas											
)+00 to 11+50					Existing Llagas Creek Channel						
1+50 to 46+50	0.40	0.16	0.287	0.0026	0.0010	2.56	5.0	8.0	28	4.9	0.16

1/ Design based on latest soils data.

2/ Design based on backwater curve.

February 1966

TABLE 10

UPPER AND LOWER LLAGAS CREEK WATERSHED PROJECTS

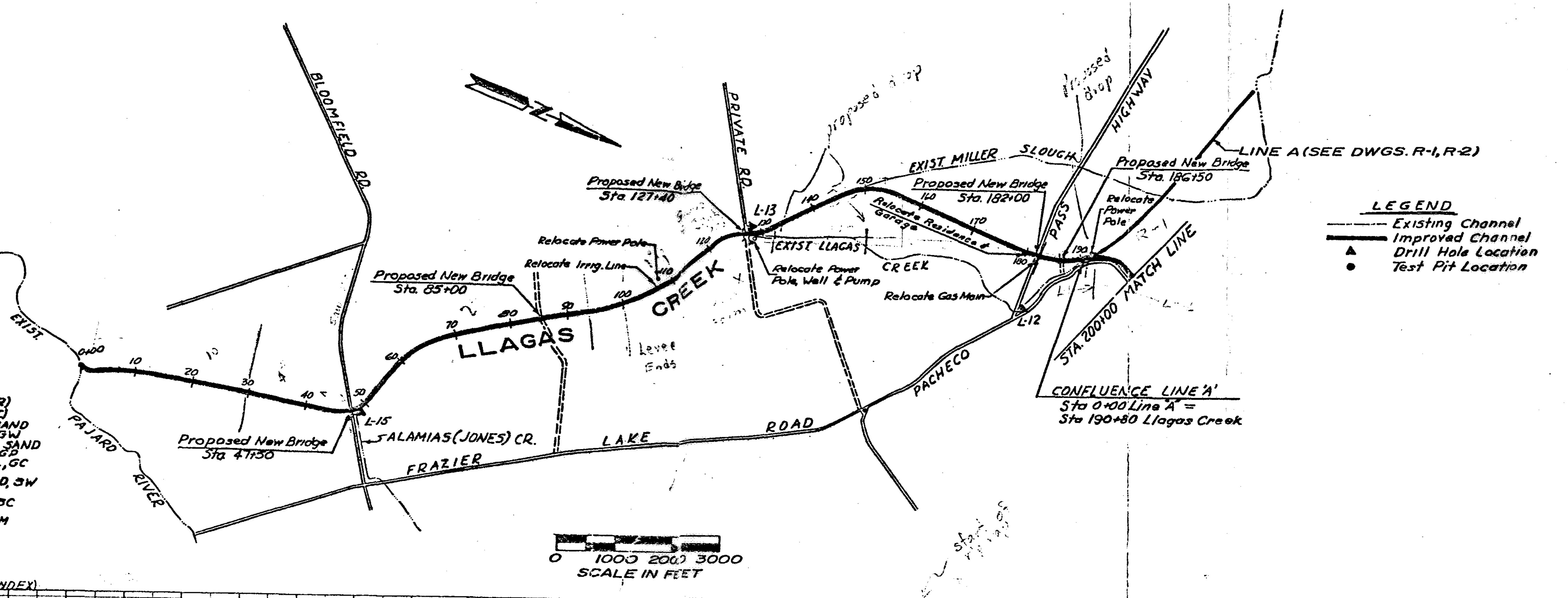
CHANNEL DESIGN CHECK - NEW SOILS DATA

LLAGAS CREEK - NON-COHESIVE SOILS

														Allowable Velocities from TR-25, fig. 6-1		
st le mber	Station	D_{75} (inches)	d (feet)	b (feet)	s (ft/ft.)	n_t	s_t	T_∞ (lb/sq.ft)	T_∞/T_b	T_b	$T_b/0.4$	Armor diameter D?(inches)	Scour Depth (inches)	Tabular Value (ft/sec.)	D	$\bar{V}$ ft/sec.
Q-1	410+00	0.60	12	99	0.0010	0.0235	0.00045	0.34	0.99	0.34	0.85	D_{84}	5.3	6.6	1.25	8.3
P-1	430+00	0.50	11	122	0.0009	0.0228	0.00038	0.26	1.0	0.26	0.65	D_{84}	4.1	6.1	1.25	7.6
2P-1	462+00	2.56	8	111	0.0031	0.030	0.0023	1.15	1.0	1.15	2.87	D_{76}	12.0	9.7	1.2	11.6
P-1	535+00	1.33	7	85	0.0026	0.0279	0.00165	0.72	1.0	0.72	1.80	D_{82}	10.0	8.4	1.18	9.9
P-1	570+00	0.70	7	85	0.0026	0.0242	0.00124	0.54	1.0	0.54	1.35	D_{90}	13.5	7.5	1.18	8.9
P-1	637+00	0.75	7	1/	0.0030	0.0245	0.00147	0.64	1.0	0.64	1.60	D_{85}	10.6	8.1	1.18	9.5
P-1	672+00	0.375	7	78	0.0030	0.022	0.0012	0.51	1.0	0.51	1.27	D_{88}	10.5	7.4	1.18	8.7
P-1	700+00	6.00	7	65	0.0042	0.0346	0.0041	1.79	0.99	1.77	4.44	D_{68}	13.9	11.0	1.18	13.0
Q-1	725+00	1.75	7	42	0.0045	0.0281	0.0029	1.26	0.98	1.24	3.10	D_{77}	13.5	9.9	1.18	11.7

Unimproved reach, no specific base width

February 1966



DRILL HOLE LEGEND

L-7 (HOLE NUMBER)
(SAMPLE NO.) 1 NP (NON PLASTIC)
WELL GRADED SAND AND GRAVEL, GW
POORLY GRADED SAND AND GRAVEL, GP
CLAYEY GRAVEL, GC
GRAVELLY SAND, SW
CLAYEY SAND, SC
SILTY SAND, SM
FAT CLAY, CH
LEAN CLAY, CL
PEAT, PT
(SAMPLE NO.) 2 24 (PLASTICITY INDEX)

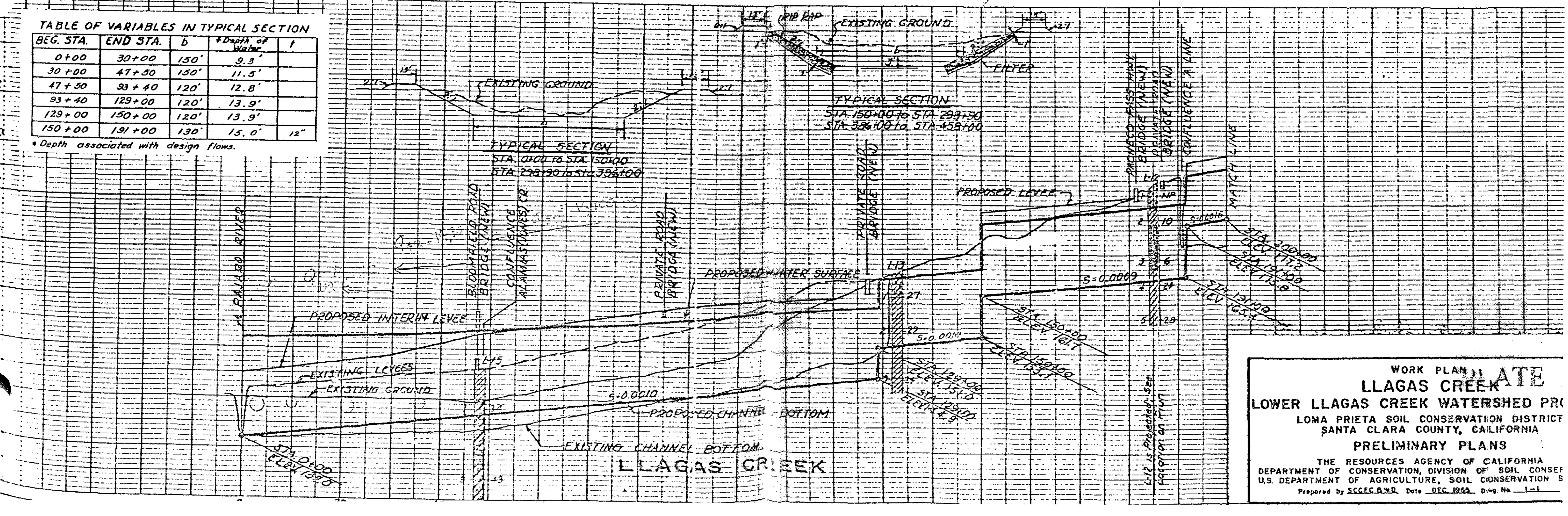
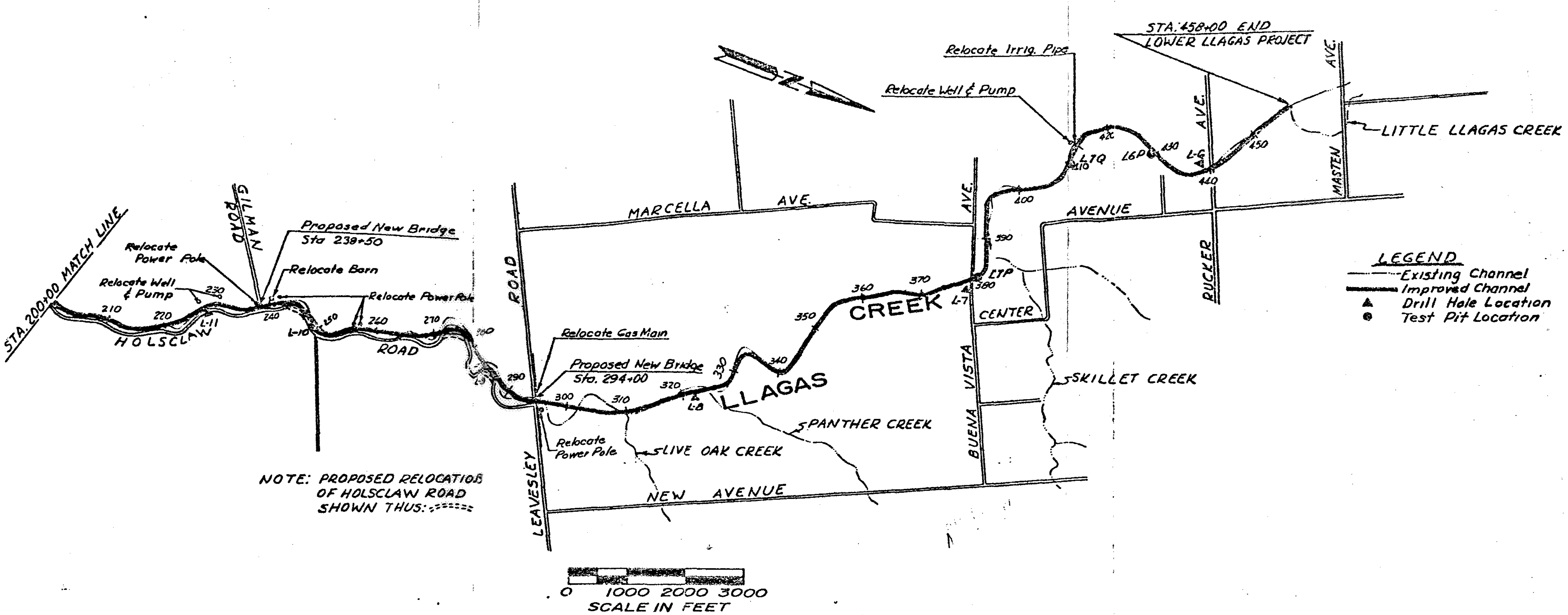


TABLE OF VARIABLES IN TYPICAL SECTION

BEG. STA.	END STA.	b	*Depth of Water	t
0+00	30+00	150'	9.3'	
30+00	47+50	150'	11.5'	
47+50	93+40	120'	12.8'	
93+40	129+00	120'	13.9'	
129+00	150+00	120'	13.9'	
150+00	191+00	130'	15.0'	12"

* Depth associated with design flows.

WORK PLAN
PLATE
LLAGAS CREEK
LOWER LLAGAS CREEK WATERSHED PR
LOMA PRIETA SOIL CONSERVATION DISTRICT
SANTA CLARA COUNTY, CALIFORNIA
PRELIMINARY PLANS
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION, DIVISION OF SOIL CONSER
U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION S
Prepared by SCCFC&WD Date DEC. 1965 Dwg. No. L-1



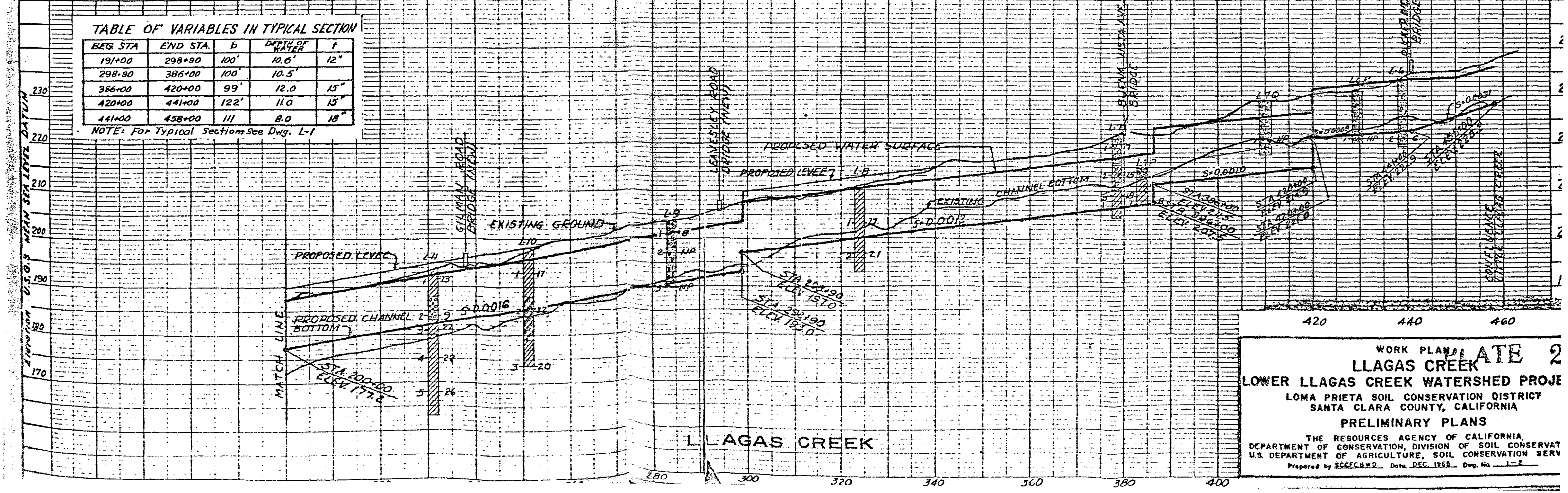


TABLE OF VARIABLES IN TYPICAL SECTION

BEG. STA	END STA.	b	DEPTH OF WATER	t
191+00	298+90	100'	10.6'	12"
298+90	386+00	100'	10.5'	
386+00	420+00	99'	12.0	15"
420+00	441+00	122'	11.0	15"
441+00	458+00	111	8.0	18"

NOTE: For Typical Sections See Dwg. L-1

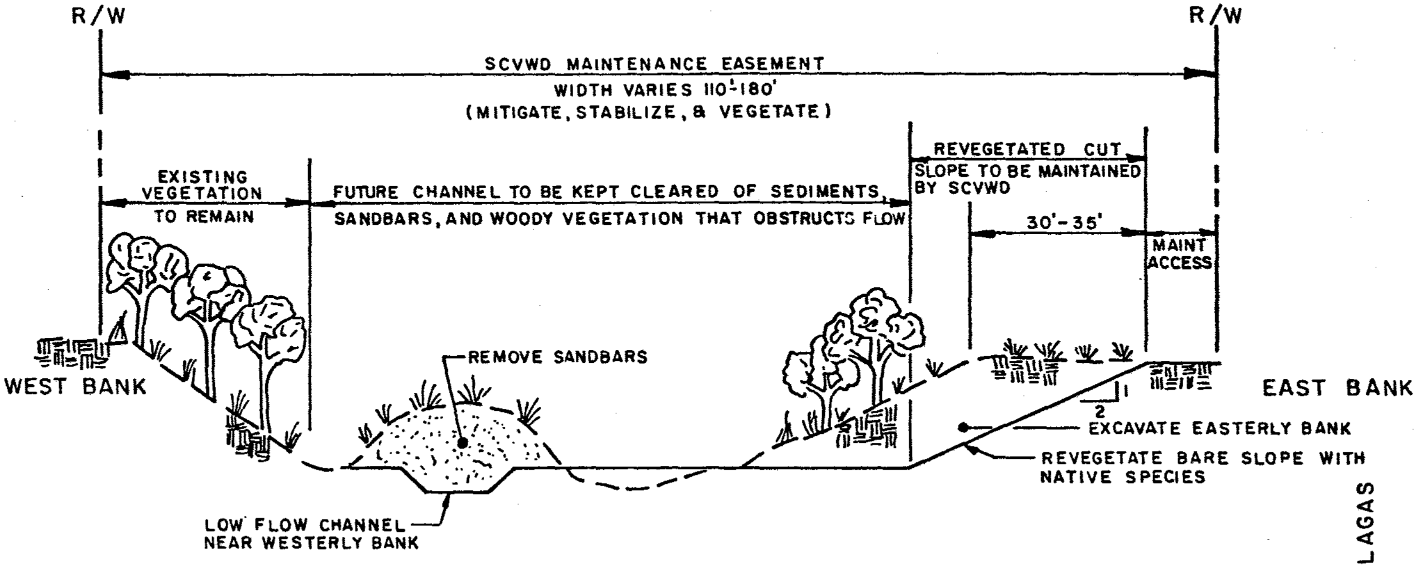
PLATE 2

WORK PLAN
LLAGAS CREEK
LOWER LLAGAS CREEK WATERSHED PROJE
LOMA PRIETA SOIL CONSERVATION DISTRICT
SANTA CLARA COUNTY, CALIFORNIA
PRELIMINARY PLANS
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION, DIVISION OF SOIL CONSERVAT
U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERV
Prepared by SCCFC&WD. Date DEC. 1965 Dwg. No. L-2

Reach 4L

This reach extends from station 379+00 to 458+00. The construction in this reach will be that adequate to pass the existing flow plus the additional flow caused by the construction upstream. This work is to prevent induced flooding. The work involves removing sand and gravel bars in the streambed, widening restricted areas and protecting with riprap the outside curves at three locations. Work will be done to minimize destruction of native vegetation. A low flow channel will be incorporated in the channel bottom to assure fish migration.

MAIN BRANCH LLAGAS CREEK

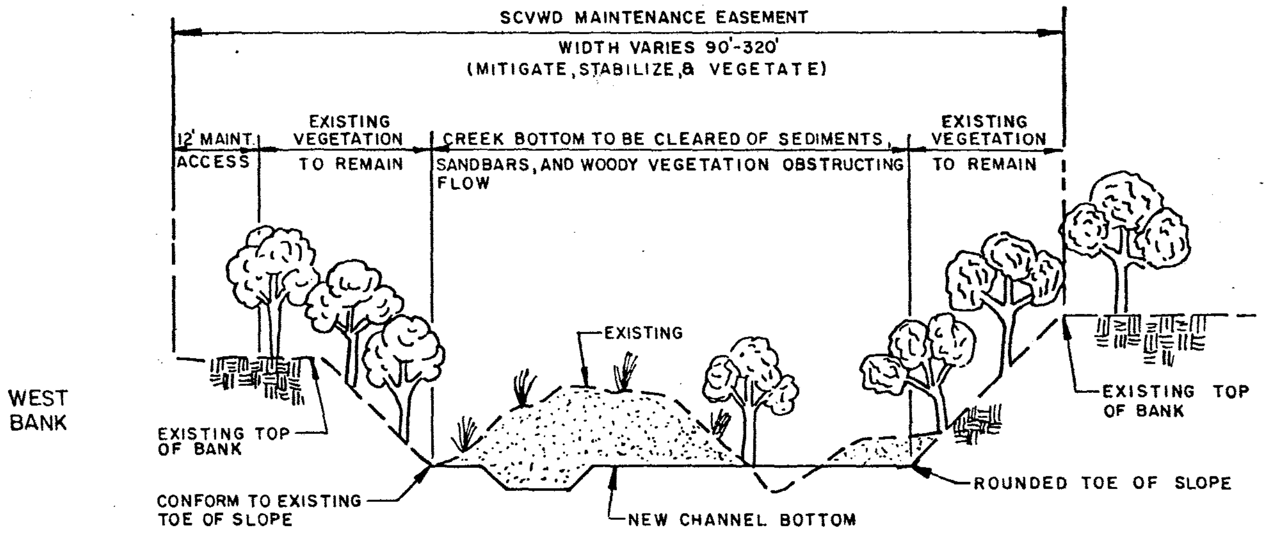

R/W
R/W
SCVWD MAINTENANCE EASEMENT
WIDTH VARIES 110'-180'
(MITIGATE, STABILIZE, & VEGETATE)
EXISTING VEGETATION TO REMAIN
FUTURE CHANNEL TO BE KEPT CLEARED OF SEDIMENTS, SANDBARS, AND WOODY VEGETATION THAT OBSTRUCTS FLOW
REVEGETATED CUT SLOPE TO BE MAINTAINED BY SCVWD
30'-35'
MAINT ACCESS
REMOVE SANDBARS
WEST BANK
EAST BANK
1
2
EXCAVATE EASTERLY BANK
REVEGETATE BARE SLOPE WITH NATIVE SPECIES
LOW FLOW CHANNEL NEAR WESTERLY BANK

STA 458+00(1000'd/s Masten) To STA 498+15(confluence w/ East Little Llagas)

UPPER LLAGAS

STA 458+00

LOWER LLAGAS


SCVWD MAINTENANCE EASEMENT
WIDTH VARIES 90'-320'
(MITIGATE, STABILIZE, & VEGETATE)
12' MAINT. ACCESS
EXISTING VEGETATION TO REMAIN
CREEK BOTTOM TO BE CLEARED OF SEDIMENTS, SANDBARS, AND WOODY VEGETATION OBSTRUCTING FLOW
EXISTING VEGETATION TO REMAIN
EXISTING
WEST BANK
EAST BANK
EXISTING TOP OF BANK
EXISTING TOP OF BANK
CONFORM TO EXISTING TOE OF SLOPE
NEW CHANNEL BOTTOM
ROUNDED TOE OF SLOPE

STA 379+00(Buena Vista Ave) To STA 458+00(1000' d/s Masten)

BUENA VISTA AVE. TO CONFLUENCE WITH EAST LITTLE LLAGAS CREEK

REACH 4

FIGURE 4

Calif
LL Hansen 7/24/81
Reach 4 L

Lower Llagas Creek

Cost Summary

Excavation	41582+7050 = 48632 ~~54417~~ cy @ 2.80	=	~~146430~~ ~~152367~~	136170
Seeding	6.72 ac @ 1200	=	8064	
Riprap	2509 (40)	=	100360	
Subtotal			~~224854~~	244594
Mobilization	3%		~~6746~~	7338
Subtotal			~~231600~~	251932
Contengency	12%		~~27792~~	30232
			~~259392~~	282164

Calif
LL Hansen 8/12/81
Reach 4 L

Lower Llagas

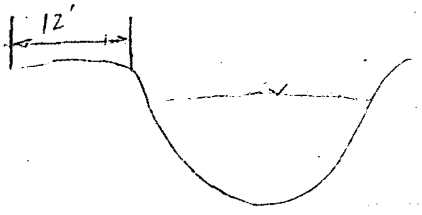
R/W

18.3 ac @ 200 = 3660
2.17 ac @ 6000 = 13056
$16716

Reach 4 Sta 379+00 to Sta 458+00

Sta no.	Creek bottom Bank to bank width	Station length	Area (ft²)
379+00	153.6	543	78,464
384+43	135.4	342	47,948
387+85	145.0	82	10,090
388+67	101.1	44	5,086
389+11	130.1	179	28,909
390+90	192.9	165	26,540
392+55	128.8	405	43,780
396+60	87.4	150	12,908
398+10	84.7	370	32,227
401+80	89.5	405	35,114
405+85	83.9	380	32,319
409+65	86.2	475	49,448
414+40	122.0	405	46,474
418+45	107.5	420	37,569
422+65	71.4	422	34,414
426+87	91.7	403	34,033
430+90	77.2	295	24,205
433+85	86.9	405	36,713
437+90	94.4	355	34,435
441+45	99.6	385	40,059
445+30	108.5	395	37,505
449+25	81.4	405	41,290
453+30	122.5	100	13,420
454+30	145.9	96	13,738
455+26	140.3	214	28,259
457+40	123.8	60	6,810
458+00	103.2		
			797,321 ft²

creek bottom = 18.3 acres



easement $= \frac{(12)(7,900)}{43,560} = 2.17$ acres

LLAGAS CREEK – REACH 4 case 7 REV3

3/ 1/8

g 12

-390'+00 – 395+00± stationing (George Nolte)

District owns the R/W

[illegible] R/W

Dist. owns (partial)

	W	
384+60	84'	
398+10	84'	$85' \times 2505 \times \frac{1}{43560} = 4.9$
401+80	89'	
405+85	84'	
409+65	86'	$\left(\frac{86+122}{2}\right)(475) \times \frac{1}{43560} = 1.1$
414+40	122'	
418+45	108	
422+65	71	
426+87	92	
430+90	77	
437+90	54	
441+50	100	
445+30	100	
449+25	80	$(80+123)(405) \times \frac{1}{2} \times \frac{1}{43560} = 0.9$
453+30	123	$(123+140)(196) \times \frac{1}{2} \times \frac{1}{43560} = 0.6$
455+26	140	$(140+124)(214) \times \frac{1}{2} \times \frac{1}{43560} = 0.$
457+40	124	$(124+103)(290) \times \frac{1}{2} \times \frac{1}{43560} = 0.$
460+30	103	$(102)(405) \times \frac{1}{43560} = 0.9$
466+35	102	
469+00	95	
472+49	82	
475+80	76	
481+15	113	$(113+127)(720) \times \frac{1}{2} \times \frac{1}{43560} = 2$
482+35	127	$(127+90)(1145) \times \frac{1}{2} \times \frac{1}{43560} = 2.$
499+80	90	
507+25	93	$88 \times 1175 \times \frac{1}{43560} = 2.4$
510+55	82	
511+55	82	

17.3

use 18

Calif
LL Hansen 7/24/81
Reach 4 L

Lower Llagas Creek

Sta 379+00 to 458+00
From crosssections developed by the SCVWD a profile of bottom & top of banks was drawn. By best fit a flow line slope of 0.0025 ft/ft was determined. Assuming a b = 50' the channel was sized

```
   WP PROG   17
      DATA
      4000.        Q1
         50.        B
         2.7        Z
      0.0025        S
       0.035        N

     OUTPUT
          8.        D
        93.2        T
       572.8        A
 5.962457162        R
 3998.286954       Q2
 6.980249571        V
   Q1/Q2 RATIO
 1.000428445
       END
```

Translocating the flowline elevations to the X-Sections and plotting the bottom width revealed that the 8' depth would fit in all locations except one, that Sta 476+00, which is in Upper Llagas Creek Watershed and will be dealt with there.

Calc

L L Hansen 7/24/81

Reach 4 L

Lower Llagas Creek

Stability

From soils data Llagas Creek Watershed April 1966
Table 10

Sta.	Ave Vel V (ft/sec)
410+00	8.3
430+00	7.6

∴ Design Vel < Ave Vel ∴ Channel Stable

Construction will be from the left side looking downstream. The construction will be to leave the rightside intact bring the bottom to grade establish a b=50' and daylight on the left side on a 2:1 slope. Those areas where the existing flowline is below the design gradient will not be brought to grade. Nature will be allowed to do that. disturbed sides and other disturbed areas outside of the channel will be seeded for erosion control. Landscaping will also be accomplished through the reach.

Calif
LLHansen 7/24/81
Reach 4L
Earth Volumes

Lower Llagas Creek

X-Sectional areas by planemeter
Scale V=H= 1"=10ft
1□" = 100□' b=50'

.78
.47
1.25

Section	A plome	Ave □'	L	Vol (cuyd)
379+00 1/	1.20			
		120	40	178
379+40	1.20			
		198	890	6527
388+30	2.75			
		239	1070	9471
399+00	2.02			
		223	1100	9085
410+00	2.44			
		217	1200	9644
422+00	1.90			
		160	1450	8592
436+50	1.30			
		158	400	2341
440+50	1.85			
		125	90	417
441+40	0.64			
		114	410	1731
445+50	1.64			
		149	650	3587
452+00	1.33			
		129	450	2150
456+50	1.25			
		125	150	694
458+00 2/	1.25			
			7900	54417

1/ taken as 379+40
2/ taken as 456+50

Calif
LL Hansen 7/28/81
Reach 4 L

Lower Llagas

Hydraulics
Aged = As built

```
   WP PROG   17
      DATA
       4000.          Q1
         45.           B
          2.           Z
      0.0025           S
       0.035           N

     OUTPUT
         8.7           D
        79.8           T
      542.88           A
  6.46997544           R
 4001.532665          Q2
 7.370934028           V
  Q1/Q2 RATIO
.9996169805
      END
```

For stability see 1966 soil test OK at
O Reach 410+00 - 452+00

TABLE 10
UPPER AND LOWER LLAGAS CREEK WATERSHED PROJECTS
CHANNEL DESIGN CHECK - NEW SOILS DATA
LLAGAS CREEK - NON-COHESIVE SOILS

Test Hole Number	Station	D_{75} (inches)	d (feet)	b (feet)	s (ft/ft.)	n_t	s_t	T_∞ (lb/sq.ft)	T_∞/T_b	T_b	$T_b/0.4$	Armor diameter D?(inches)	Scour Depth (inches)	Allowable Velocities from TR-25, fig. 6-1 Tabular Value (ft/sec.)	D	$\bar{V}$ ft/sec.
L7Q-1	410+00	0.60	12	99	0.0010	0.0235	0.00045	0.34	0.99	0.34	0.85	D_{84}	5.3	6.6	1.25	8.3
LGP-1	430+00	0.50	11	122	0.0009	0.0228	0.00038	0.26	1.0	0.26	0.65	D_{84}	4.1	6.1	1.25	7.6
A12P-1	462+00	2.56	8	111	0.0031	0.030	0.0023	1.15	1.0	1.15	2.87	D_{76}	12.0	9.7	1.2	11.6
L5P-1	535+00	1.33	7	85	0.0026	0.0279	0.00165	0.72	1.0	0.72	1.80	D_{82}	10.0	8.4	1.18	9.9
L4P-1	570+00	0.70	7	85	0.0026	0.0242	0.00124	0.54	1.0	0.54	1.35	D_{90}	13.5	7.5	1.18	8.9
L3P-1	637+00	0.75	7	1/	0.0030	0.0245	0.00147	0.64	1.0	0.64	1.60	D_{85}	10.6	8.1	1.18	9.5
L2P-1	672+00	0.375	7	78	0.0030	0.022	0.0012	0.51	1.0	0.51	1.27	D_{88}	10.5	7.4	1.18	8.7
L1P-1	700+00	6.00	7	65	0.0042	0.0346	0.0041	1.79	0.99	1.77	4.44	D_{68}	13.9	11.0	1.18	13.0
L1Q-1	725+00	1.75	7	42	0.0045	0.0281	0.0029	1.26	0.98	1.24	3.10	D_{77}	13.5	9.9	1.18	11.7

1/ Unimproved reach, no specific base width

February 1966

Calc
LL Hanson 7/28/85
Reach L

Lower Llagas

F = 45'   From SCVWD XSections

Scale 1"=10'   1□"=100□'

Section	A□" (planimeter)	A□" reduced	A□"	Ave A□'	L (ft)	Vol (cu yd)
379+00	1.20	.34	.86			
				86	40	127
379+40	1.20	.34	.86			
				150	890	4944
388+30	2.75	.61	2.14			
				183	1070	7252
399+00	2.02	.50	1.52			
				169	1100	6885
410+00	2.44	.58	1.86			
				170	1200	7555
[illegible]	[illegible]	.37	1.53			
				114	1450	6122
[illegible]	[illegible]	.56	.74			
				122	400	1807
[illegible]	[illegible]	.15	1.70			
				111	90	370
[illegible]	.64	.12	.52			
				88	410	1336
[illegible]	[illegible]	.40	1.24			
				118	650	2840
[illegible]	1.33	.21	1.12			
				107	450	1783
[illegible]	1.25	.24	1.01			
				101	150	561
[illegible]	1.25	.24	1.01			
					7900	41582

LLAGAS CREEK – REACH 4

4/10/81
127 Ty

Maint work at channel Bottom only (Reach 4)

2 C.Y/l.f × 12144 = 24288 C.Y.

Cost @ $3.5/C.Y × 24,288 = $ 85008 use $95,000

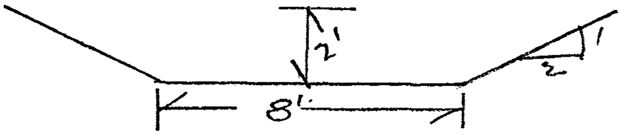
Superceded

Calif
LL Hansen 7/31/81
Reach 4 L

Lower Llagas

Low flow channel

This is installed for mitigation of fisheries . . .



Vol of excavation / ft $= \dfrac{8(2)+2(2)^2}{27} = 0.89$ cy/ft

$L = 45800 - 37900 = 7900'$

Vol $= .89(7900) = \underline{\underline{7031}}$ cy use $\underline{\underline{7050}}$ cy

Calif
LL Hansen 7/24/81
Reach 4L

Lower Llagas Creek

Seeding for erosion control

Seed cut banks and maintenance road

Road w = 12'

$L = 458+00 - 379+00 = 7900'$

$A = 12(7900) = 94800 \text{ ft}^2$

Cut Slopes

Sta	W	Aw	L	Area
379+00	33			
		33	40	1320
379+40	33			
		33	890	29370
388+30	32			
		29	1070	31030
399+00	26			
		25	1100	27500
410+00	23			
		24	1200	28800
422+00	24			
		26	1450	37700
436+30	27			
		19	400	7600
440+30	11			
		12	90	1080
441+40	14			
		19	410	7790
445+50	24			
		20	650	13000
452+00	16			
		20	450	9000
456+50	24			
		24	150	3600
458+00	24			
				197790

Σ Seeding = 94800 + 179790 = $\frac{292590}{43560}$ = 6.72 ac

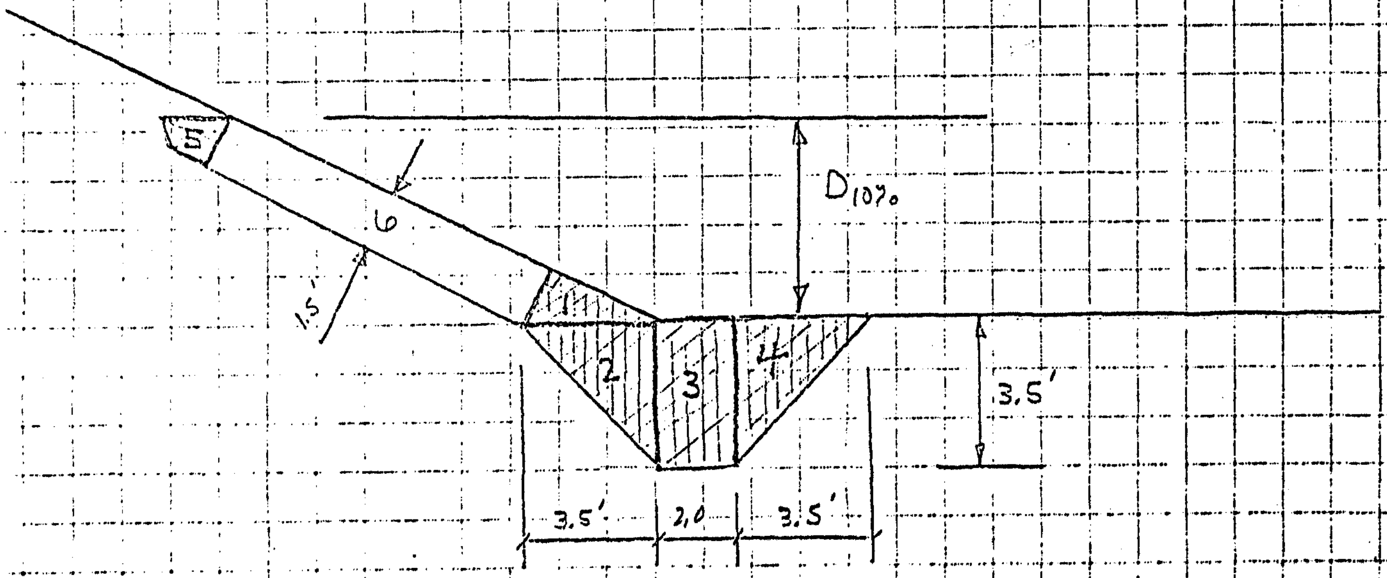
11/80

RIPRAP C[illegible]s.

① determine $d_{n\,10\%}$ → Given: $Q_{10\%}$, b, S, n

S.f. of rock lining for one bank

$$= \left[\sqrt{(2)^2 d_{10\%}^2 + d_{10\%}^2}\right](1.5) + 22.87$$



① $A_1 = (3.16)(1.5)\frac{1}{2} = 2.37$ s.f.

② $A_2 = \frac{1}{2}(3.5)^2 = 6.13$ s.f.

③ $A_3 = (2.0)(3.5) = 7.00$ sf

④ $A_4 = \frac{1}{2}(3.5)^2 = 6.13$ sf

⑤ $A_5 = 1.24$ sf

22.87 sf.

⑥ $A_6 = \left[\sqrt{2P_{10\%}^2 + D_{10\%}^2}\right]1.5$

Calif
LLH 7/28/81
Reach 4L

Lower Llagos

Riprap the following areas for stability on the outside curves

379+40 → 384+40
395+20 → 399+20
406+60 → 410+60

L = 1280'

Volume per foot

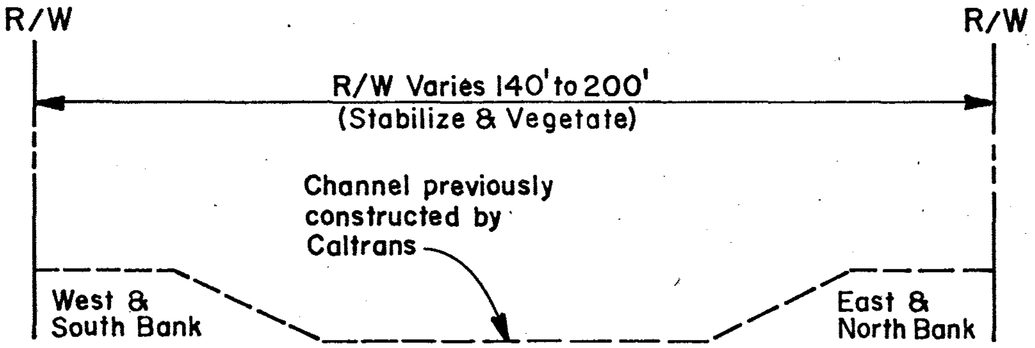
$$Vol = \frac{22.8 + \left(\sqrt{2d^2+d^2}\right)(2')}{27} = \frac{22.8 + \left(\sqrt{8.7^2(2)+8.7^2}\right)(2)}{27} = \frac{52.9}{27} = 1.96 \text{ cy/ft}$$

$$\Sigma Vol = 1.96\ (1280) = \underline{\underline{2509}} \text{ cy}$$

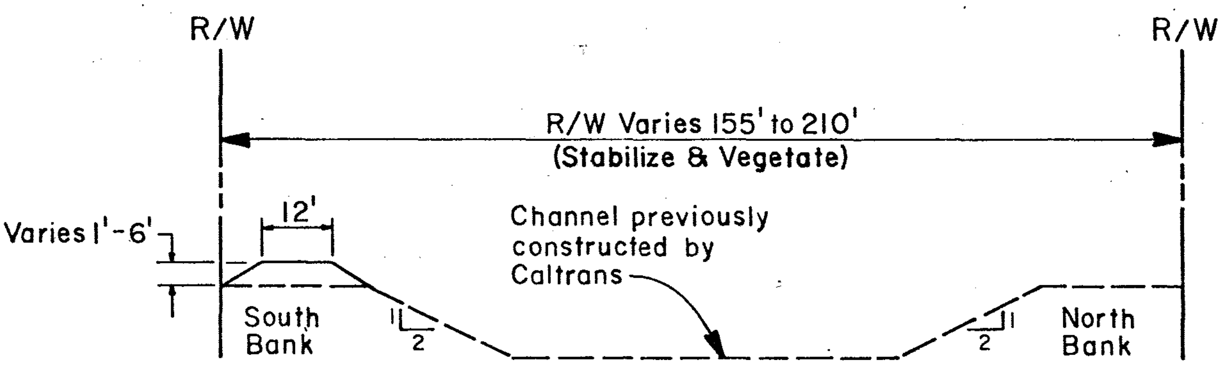
Reach 9

This reach extends from station 0+00 to 169+00 on West Branch Llagas Creek. The channel was excavated to rough grade by CalTrans in 1972 for fill needed to build Freeway 101. Work in this reach is to stabilize the bottom and sides. Three drop structures are needed to control grade. Some levee construction is required to contain the 100 year event. Three bridges will need to be replaced at Leavesley Road, Murray Avenue, and at the Railroad at Monterey Road.

WEST BRANCH LLAGAS CREEK



STA. 58+00 (South Valley Fwy.) To STA. 169+00 (Monterey Road)



STA. 0+00 (Confluence w/ Main Branch) To STA. 58+00 (South Valley Fwy.)

CONFLUENCE WITH MAIN BRANCH TO MONTEREY RD.

REACH 9

FIGURE 11

LLAGAS CREEK - No Flood Control Work (Existing)

Reach 9.

3 drop structures

488 c.y/ea. X 3ea X $350/c.y. = 512,400 | 512,4

Rock riprap

Soil is cohesive

The average velocity is 6 fps.

Rock riprap will be required at Drop structures 474 C.Y. (work plans) X 40 = $18,960 | 159

| 5313

15% contigency including 3% engineering | 79

Total Cost | 611,0

Calif
L L Hansen 7/29/81
Reach 9

Lower Llagas

Levee Embankment	9345 cy	@ $2.25/cy	=	21,026
Drop Structures (3)	1620 cy	@ $350/cy	=	567,000
Riprap	474 cy	@ $40/cy		18,960
Site preparation	3.6 ac.	@ $115/ac		414
subtotal				607,400
Landscape @ 3%				18 222
subtotal				625,622
Mobilization @ 6%				37,537
subtotal				663,159
Contengency 12%				79,579
				$742,738

Note mobilization should be 3% or $18769
don't change at this time.

137

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 9 Sta 0+00 — Sta 169+00 case 9

Superceded

Item	Quantity	Unit Cost	$
Channel Excavation			
Levee Compacted Embankment	9345 c.y.	2.25 c.y.	21026
Drop Structures	~~(1444)~~ ~~976~~ 3 ea	350 c.y.	341,600
Drainage Inlets			
Riprap	474 c.y.	40	18,960
er Stone			
S[illegible]ing			
Landscaping		3%	11,572
Structural Excavation			
Rectangular Concrete Channel			
Compacted Backfill			
Levee Embankment			
Site Preparation (Levees)	3.6	1,150	4140
Mobilization		6%	23,838

Subtotal 421,136

~~15~~ 12% Contingency 50,536

TOTAL 471,672

Calif
LL Hansen 8/11/81
Previous Work

Lower Llagas

from SCVWD

R/W 29acres - $258,000

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

REACH NO. 9 Sta0+00 - Sta.169+00 case 9

Item	Quantity	Unit Cost	Leavensely Bridge 760,365
State and County Bridges	4800	45	216,000
Private Bridges	112	510	57120
RCB-Culverts fencing	500	6	3,600
Relocation of Utilities			50,000

Subtotal 1,087,085

17 ~~15%~~ Contingency 130,450

TOTAL 1,087,035

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom			
Agricultural			
Potential Residential (low value)			
Potential Residential (medium value)			
Residential/School			
Dwellings			

TOTAL 0

Calif
LL Hansen 7/29/81
Reach 9

Lower Llagas

Drop Structures

3 drops required

Sta	Drop	Q	Vol
0+00	3.2	6160	585
48+00	4	6160	585
110+75	4	4800	450
			1620

Calif
LL Hansen 7/22/81
Reach 9

Lower Llagas

0+00 – 55+00

Aged

As Built

```
      WP PROG      1                  WP PROG      1
         DATA                            DATA
          6160.        Q1                 3500.        Q1
            13.8       D                    10.1       D
             50.       B                     50.       B
              2.       Z                      2.       Z
         0.0009        S                 0.0009        S
          0.035        N                  0.035        N
          RUN                             RUN
          105.2        T                   90.4        T
       1070.88         A                 709.02        A
    9.585780204        R            7.450148474        R
    6155.043669        Q2           3444.877563        Q2
    5.747650222        V            4.858646531        V
     Q1/Q2 RATIO                     Q1/Q2 RATIO
    1.000805247                     1.016001276
         END                             END
```

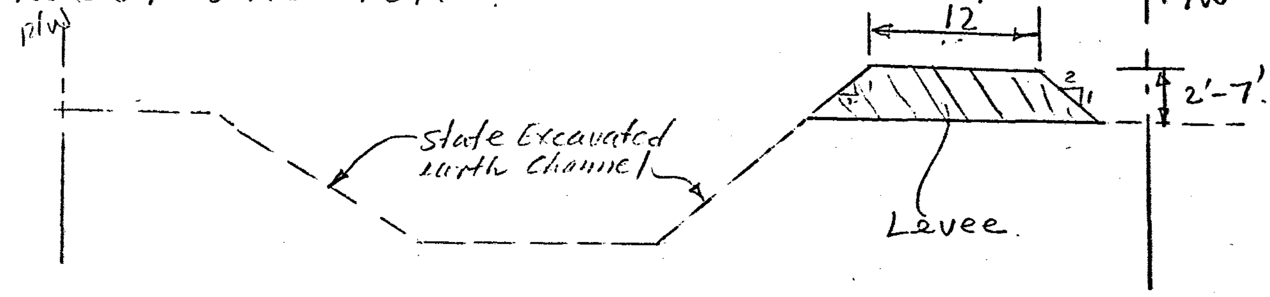
55+00 – 169+00

```
      WP PROG      1                  WP PROG      1
         DATA                            DATA
          4800.        Q1                 2700.        Q1
             11.       D                      8.       D
             50.       B                     50.       B
              2.       Z                      2.       Z
         0.0013        S                 0.0013        S
          0.035        N                  0.035        N
          RUN                             RUN
             94.       T                     82.       T
           792.        A                   528.        A
    7.984394501        R            6.155489939        R
    4843.310149        Q2           2714.760038        Q2
    6.115290593        V            5.141590981        V
     Q1/Q2 RATIO                     Q1/Q2 RATIO
    .9910577378                     .9945630413
         END                             END
```

LLAGAS CREEK - Reach 9

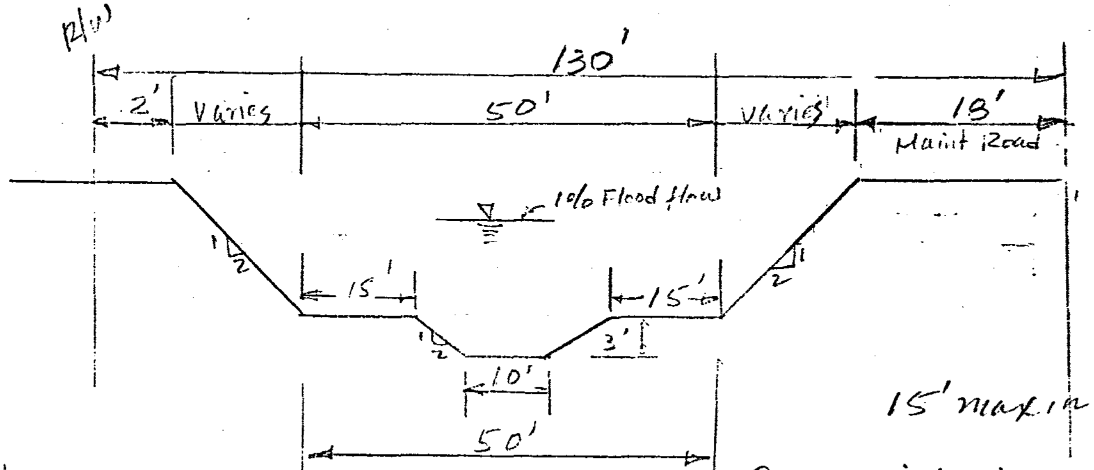
3/8/21
Gj 142

Reach 9 0+00 - 169+00



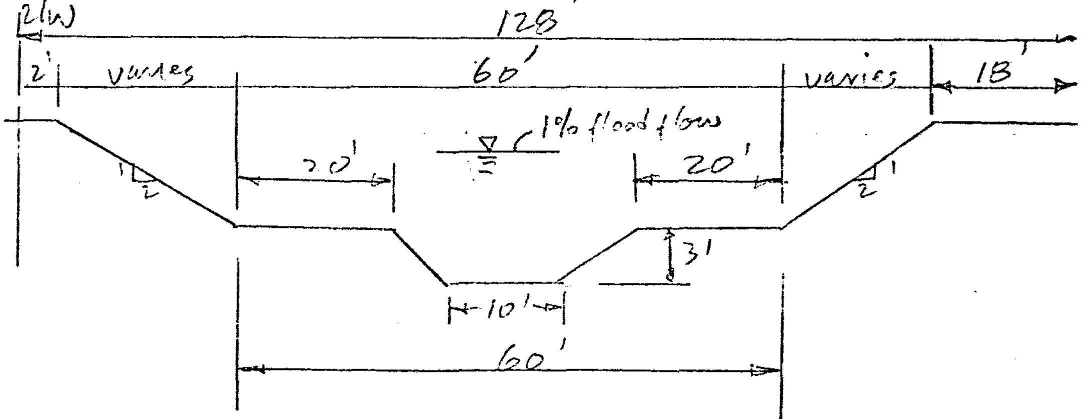
REACH 9
sta 0+00 - 169+00
LOOKING upstream

Reach 10 169+00 - 182+00



15' max in depth

Sta 182+00 - 195+00 see reach 12 (same width)
Reach 11A sta 182+00 - 220+00

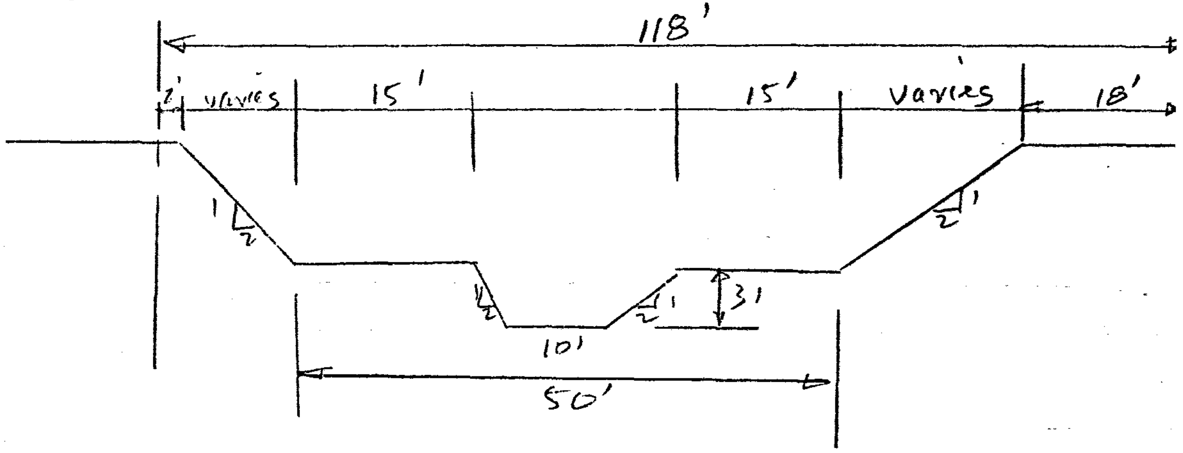


R/W = 2'+24+60+24+18' = 128
12' Max in depth.

LLAGAS CREEK

3/8/81
Ty 14.

Reach 11A 197+00 - 220+00



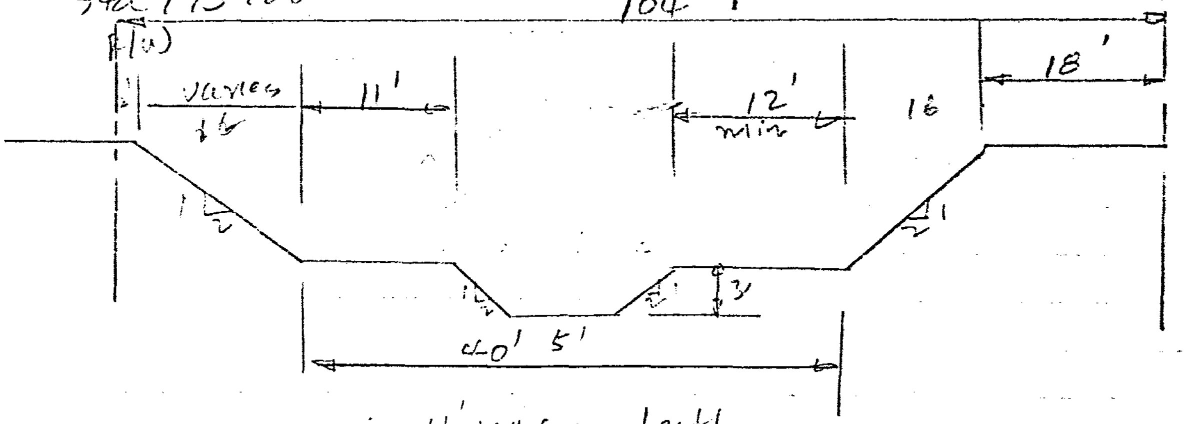
12' max in depth.

R/W = 2+24+50+24+18 = 118

Reach 12. 195+00 - 211+00

sta 195+00 -

✓

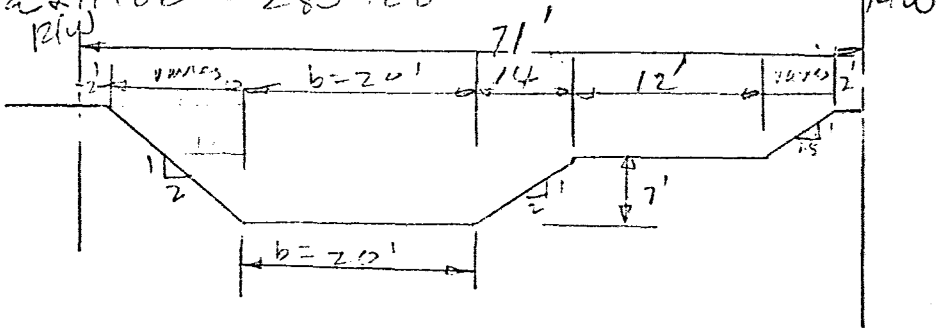


11' max in depth

R/W = 40+2+22+22+18 = 104

✓

sta 211+00 - 285+00

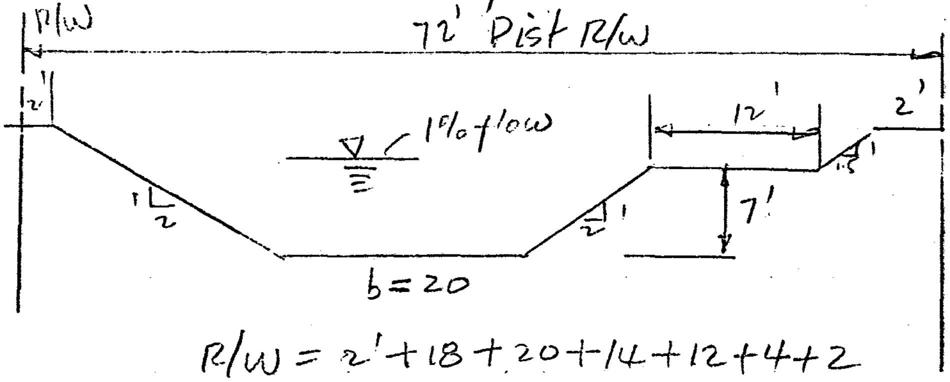


9' max in depth

LLAGAS CREEK— West Branch

3/8/81
g 144

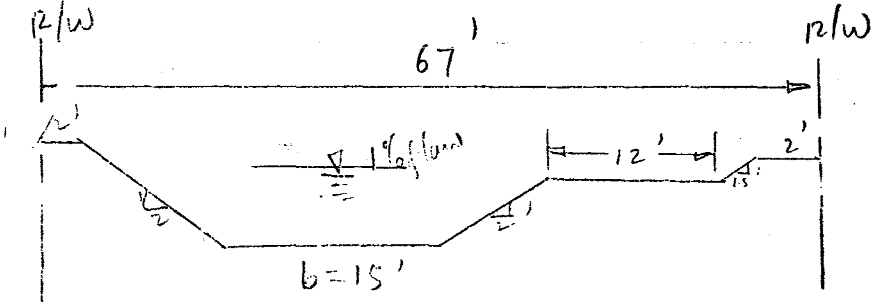
√ Reach 13 S&N . Morey Channel 211+00–230+00



R/W = 2'+18+20+14+12+4+2
= 72'

9' max in depth

√ Morey C 230+00 — 245+00



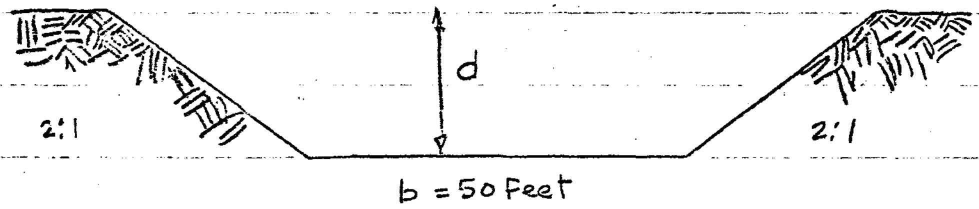
9' max in depth

North Morey Channel
211+00 – 233+00
b = 20'
R/W - Dist owns the R/W.

B.K.
1/30/8
145

West Branch Llagas Creek
Reach 9

existing Channel Capacity for Ronan channel
(EXCAVATED BY STATE)



$S = 0.0013$ Sta 48+00 to Sta 169+00

$S = 0.0009$ Sta 2+00 to Sta 48+00

$n = 0.035$

$d = 12\,ft$ $\quad d/b = 12/50 = 0.240$

$$K = \frac{Qn}{d^{8/3} S^{1/2}} = 7.32$$

$$Q = 7.32 \frac{d^{8/3} S^{1/2}}{n} = 7.32 \frac{(12)^{8/3} (0.0009)^{1/2}}{0.035} = \underline{4{,}736\ C.F.S}$$

$d = 15\,Ft$ $\quad d/b = 15/50 = 0.30$

$$K = \frac{Qn}{d^{8/3} S^{1/2}} = 6.15$$

$$Q = 6.15 \frac{d^{8/3} S^{1/2}}{n} = 6.15 \frac{(15)^{8/3} (0.0009)^{1/2}}{0.035} = \underline{7{,}214\ cfs}$$

$$A = bd + 2d^2 = (50)(15) + 2(15)^2 = 1{,}200\,ft^2$$

$$V = \frac{Q}{A} = \frac{7{,}214}{1{,}200} = 6.01\ Ft/sec$$

$d = 13\text{ft}$ $\quad d/b = 13/50 = 0.26$

$$K = \frac{Qn}{d^{8/3}S^{1/2}} = 6.87$$

$$Q = 6.87\,\frac{d^{8/3}S^{1/2}}{n} = 6.87\,\frac{(13)^{8/3}(0.0009)^{1/2}}{0.035} = \underline{\underline{5{,}502 \text{ C.F.S.}}}$$

✓ $d = 14\text{ ft}$ $\quad d/b = 14/50 = 0.28$

$$K = \frac{Qn}{d^{8/3}S^{1/2}} = 6.48$$

$$Q = 6.48\,\frac{d^{8/3}S^{1/2}}{n} = 6.48\,\frac{(14)^{8/3}(0.0009)^{1/2}}{0.035} = \underline{\underline{6{,}324 \text{ c.f.s.}}}$$

$d = 11\text{ ft}$ $\quad d/b = 11/50 = 0.22$

$K = 7.86$

$$Q = 7.86\,\frac{(11)^{8/3}(0.0009)^{1/2}}{0.035} = \underline{\underline{4{,}032 \text{ c.f.s.}}}$$

(ft) d_{max}	(c.f.s.) Q	(ft²) A	(ft/sec) V
11	4,032	792	5.1
12	4,736	888	5.3
13	5,502	988	5.6
14	6,224	1,092	5.8
15	7,214	1,200	6.0

for Sta 2+00 to Sta 48+00
$s = 0.0009$

$S = 0.0013 \quad , n = 0.035 \quad , b = 50$

$d = 12 \text{ ft} \qquad d/b = 12/50 = 0.24$

$$K = \frac{Qn}{d^{8/3} S^{1/2}} = 7.32$$

$$Q = 7.32 \frac{d^{8/3} S^{1/2}}{n} = 7.32 \frac{(12)^{8/3} (0.0013)^{1/2}}{0.035} = \underline{\underline{5{,}692 \text{ C.F.S.}}}$$

$d = 13 \text{ ft} \qquad d/b = 13/50 = 0.26$

$K = 6.87$

$$Q = 6.87 \frac{(13)^{8/3} (0.0013)^{1/2}}{0.035} = \underline{\underline{6{,}613 \text{ C.F.S.}}}$$

$$K'_c = \frac{Q}{b^{5/2}} = \frac{6613}{\quad}$$

$d = 14 \text{ ft} \qquad d/b = 14/50 = 0.28$

$k = 6.48$

$$Q = 6.48 \frac{(14)^{8/3} (0.0013)^{1/2}}{0.035} = \underline{\underline{7{,}600 \text{ C.F.S.}}}$$

$d = 15 \text{ ft} \qquad d/b = 15/50 = 0.30$

$k = 6.15$

$$Q = 6.15 \frac{d^{8/3} S^{1/2}}{n} = 6.15 \frac{(15)^{8/3} (0.0013)^{1/2}}{0.035} = 8{,}670 \text{ cfs.}$$

sta 48+00 to sta 169+00

(ft)	c.f.s	ft^2	ft/sec
d_{max}	Q	A	V
12	5692	888	6.4
13	6,613	988	6.7
14	7,600	1092	6.9
15	8,670	1,200	7.2

$Q = 4800$ 1%

$$K' = \frac{Qn}{b^{8/3}S^{1/2}} = \frac{(4800)(.035)}{(33930)(.036)} = .138$$

$$\frac{D_n}{b} = 0\ 22 \quad D_n = 11'$$

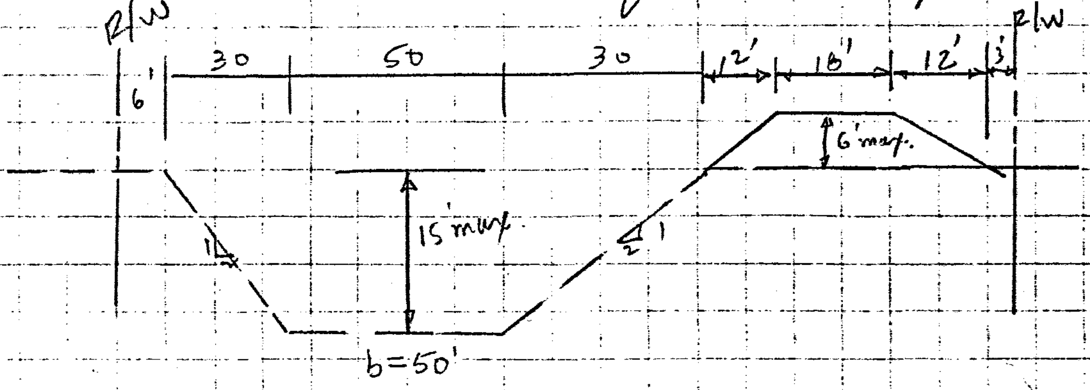
The: channel has the capacity

$$V = \frac{Q}{A} = \frac{4800}{792} = 6.1 \text{ fps.}$$

1-9-81
TY

LLAGAS CREEK — Reach 9 case X 9

REACH 9 Between sta 0+00 – 55+00 no freeboard.
Provide Levee on the Southerly side of existing Channel onl



Max R/W = 161' use 165'

District owns the R/W.

Clearing

$45' \times 3500 \times \frac{1}{43560} = \boxed{3.6 Ac}$

Levee Embankment

Average height 3'

$2.67\ C.Y./l.f \times 3500 = \boxed{9{,}345\ C.Y.}$

Between Sta 55+00 – 169+00 no freeboard

The channel has the capacity (see Hydraulic Ca

District owns the R/w

No work is req. in this Reach

Velocity varies from 6.4 fps to 7.2 fps. Erosion

Control work may be req.

Construct one new bridge at Murray Ave.

$(110+10) \times 40 = 4{,}800\ S.F.$

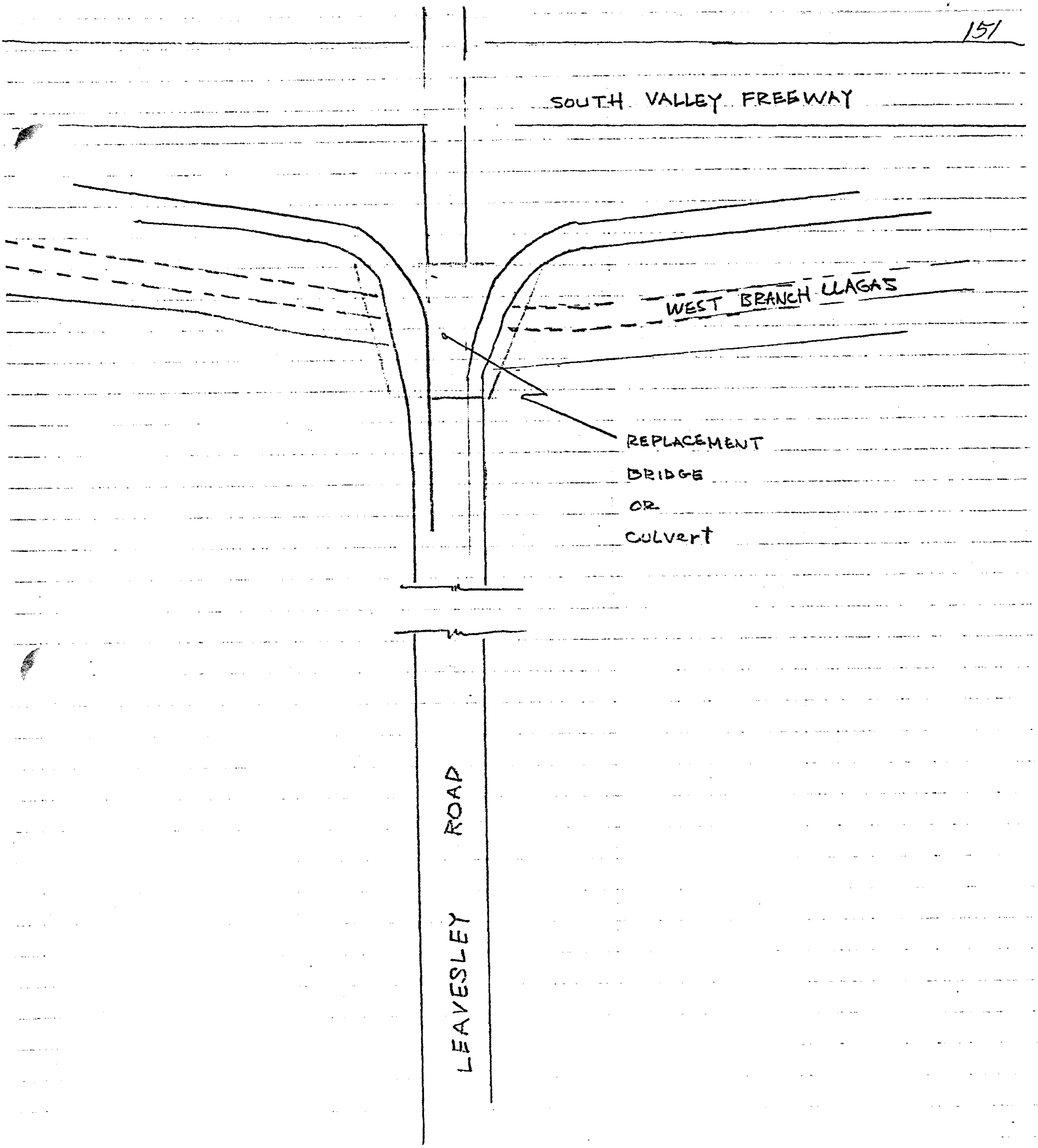
Drop structure 3 ea 976 C.Y.

[illegible] lining at Road crossing only (500 l.f)

Case 7 Reach 9

Cost reduction due to:

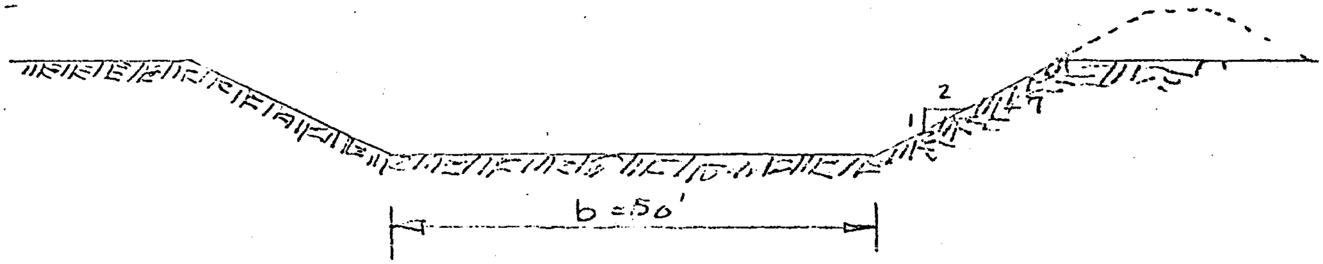
1) take out fencing
2) no channel exc.
3) no additional R/w req.
4) no seeding


SOUTH VALLEY FREEWAY
WEST BRANCH LLAGAS
REPLACEMENT BRIDGE OR CULVERT
LEAVESLEY ROAD

Reach 9 - West Branch Llagas Creek 3/26/8
Sta 0+00 to Sta 169+00 152

sta 169+00 to sta 55+00 $Q = 4800$ c.f.s.
sta 55+00 to sta 0+00 $Q = 6160$ c.f.s

sta 169+00 to Sta 48+00 $S = 0.0013$
sta 48+00 to sta 0+00 $S = 0.0009$



typical cross-section

$$Q_c = d_c^{3/2} \sqrt{\frac{g(b+zd_c)^3}{b+2zd_c}}$$

$$6160 = d_c^{3/2} \sqrt{\frac{g(50+(2)d_c)^3}{50+(2)(2)d_c}}$$

$$37{,}945{,}600 = (6160)^2 = d_c^3 \left(\frac{g(50+2d_c)^3}{50+4d_c} \right)$$

sto 0 d_c
sto 1 g
sto 2 50

Trial & error

d_c	Y
4	6,092,224
5	12,420,000
6	22,400,255
7	37,118,918
7.05	38,000,609

$$\boxed{d_c = 7.0 \text{ ft}}$$

water surface elev. at Sta 0+00
when $d_c = 7.0 \Rightarrow$ W.S $= 165.3 + 7.0 = 172.3$
tailwater condition control

find d_c at 11148

$$Q_c = d_c^{3/2} \sqrt{\frac{g(b + z d_c)^3}{b + 2 z d_c}}$$

$$4800 = d^{3/2} \sqrt{\frac{g(46 + 2 d_c)^3}{46 + 4 d_c}}$$

$b = 46$ ft

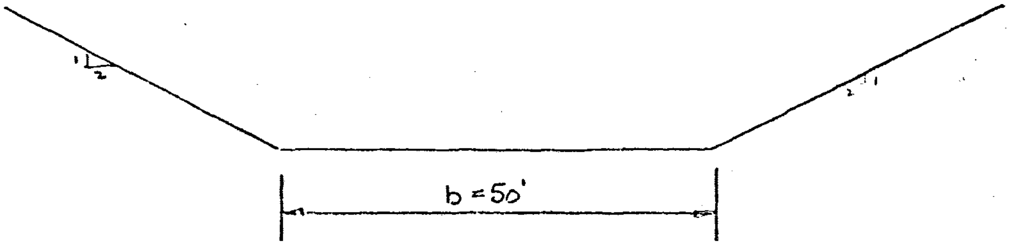
$z = 2$

$Q = 4800$ c.f.s.

by trial & error

d_c	Y
3	1,452
4	2,288
5	3,273
6	4403
7	5678
6.5	5022
6.3	4770
6.32	4795

Reach 9



$S = 0.0009$

$Q = 6500$

$n = 0.035$

$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(6500)(0.035)}{(50)^{8/3}(0.0009)^{1/2}} = 0.2235$$

$$\frac{.29 - .28}{.232 - .217} = \frac{.29 - x}{.232 - .2235}$$

$D/b = 0.2843$

$D_n = 14.21$

$$K' = \frac{(4800)(0.035)}{(50)^{8/3}(0.0013)^{1/2}} = 0.1373$$

$$\frac{.22 - .21}{.139 - .127} = \frac{.22 - x}{.139 - .1373}$$

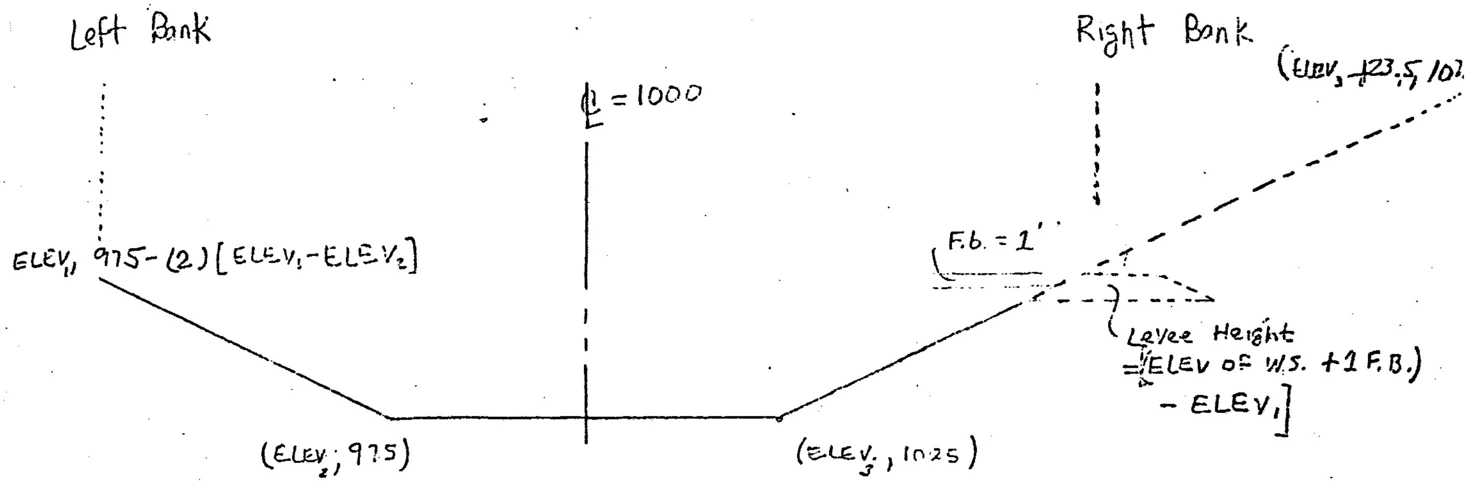
$D/b = 0.2186$

$D_n = 10.93$ ft

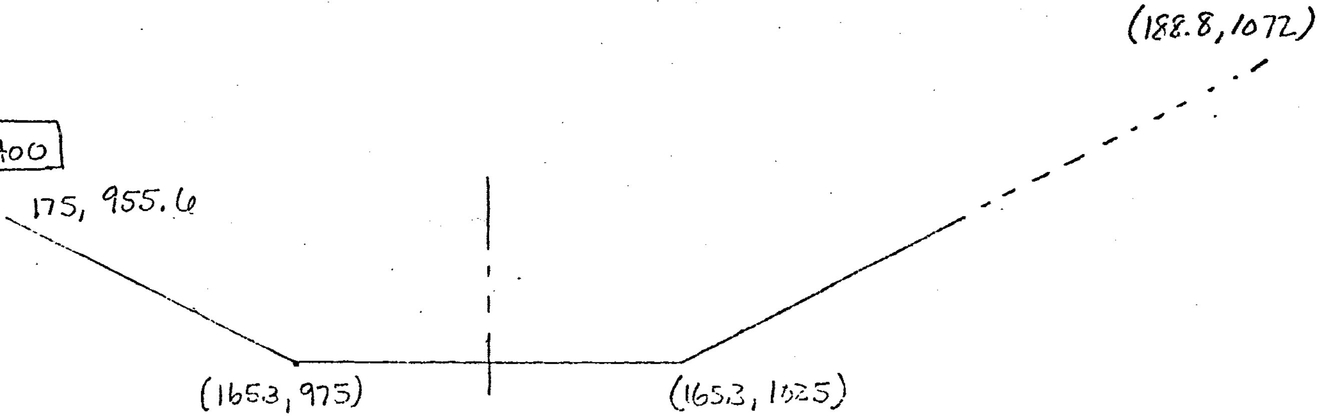
$$K' = \frac{(4800)(0.035)}{(46)^{8/3}(0.0013)^{1/2}} = 0.1715$$

$$\frac{.24 - .25}{.163 - .176} = \frac{.24 - x}{.163 - .1715}$$

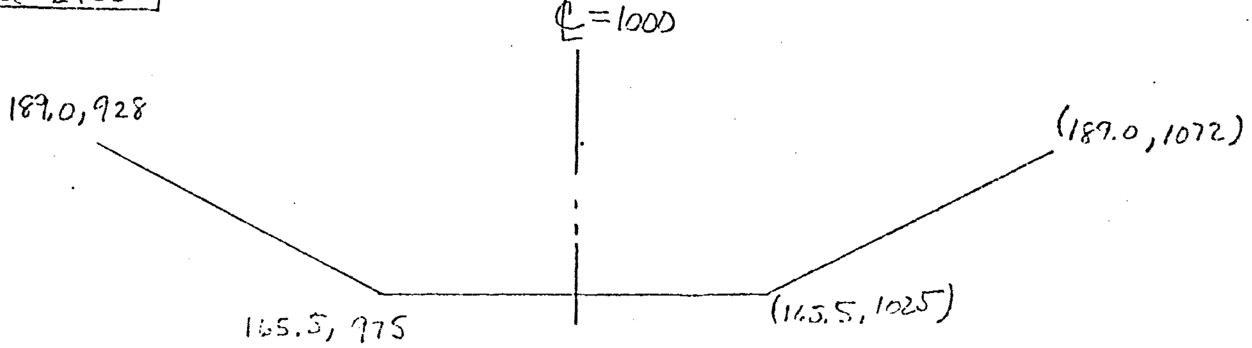
$d/b = 0.2465$ $\quad$ $d_n = 11.34$



sta 0+00



sta 2+00

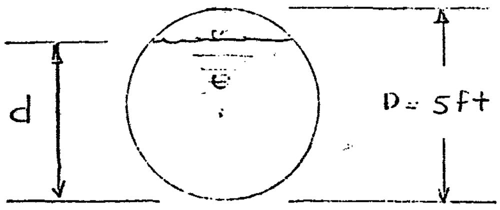


Leavesley Rd.
Bridge

2 - 60" X 306' C.M.P. → Present Conditions

$n = 0.024$ $\qquad Q_T = 4800$ c.f.s.

$S_o = 0.0013$



let d = 4'

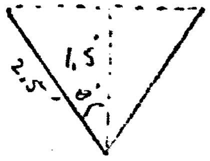
$\frac{d}{D} = \frac{4}{5} = 0.80$

$$Q_n = \frac{1.456}{n} a r^{2/3} S_o^{1/2}$$

$$\text{Area}, a = \frac{D^2}{8}\left(2\pi - \frac{\pi\theta}{180} + \sin\theta\right)$$

$$= \frac{5^2}{8}\left(2\pi - \frac{\pi(53.13)}{150} + \sin 53.13\right)$$

$$= (6.16)\frac{5^2}{8} = 19.24 \text{ ft}^2$$



$$\cos\theta' = \frac{1.5}{2.5}$$

$$\theta' = 53.13^\circ = .9273$$

$$WP = \frac{\pi D(360-\theta)}{360} = \frac{\pi(5)(360-53.13)}{360}$$

$$= 13.39$$

$$r = \frac{45D}{\pi(360-\theta)}\left(2\pi - \frac{\pi\theta}{180} + \sin\theta\right) = \frac{45(5)}{\pi(360-53.13)}\left(2\pi - \frac{\pi(53.13)}{180} + \sin 53.13\right.$$

$$= 1.4367$$

$$Q_n = \frac{1.486}{0.024}(19.24)(1.4367)^{2/3}(0.0013)^{1/2}$$

$$= 54.69 \text{ c.f.s}$$

Replace c.m.p.

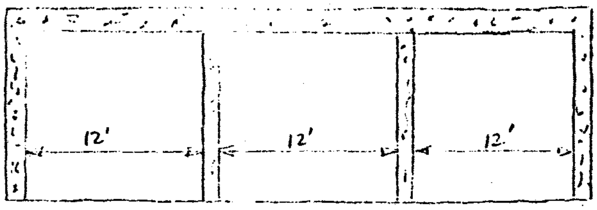
$$Q = (2) \times 54.69 = \boxed{109.4 \text{ c.f.s}}$$

Leavesley Road

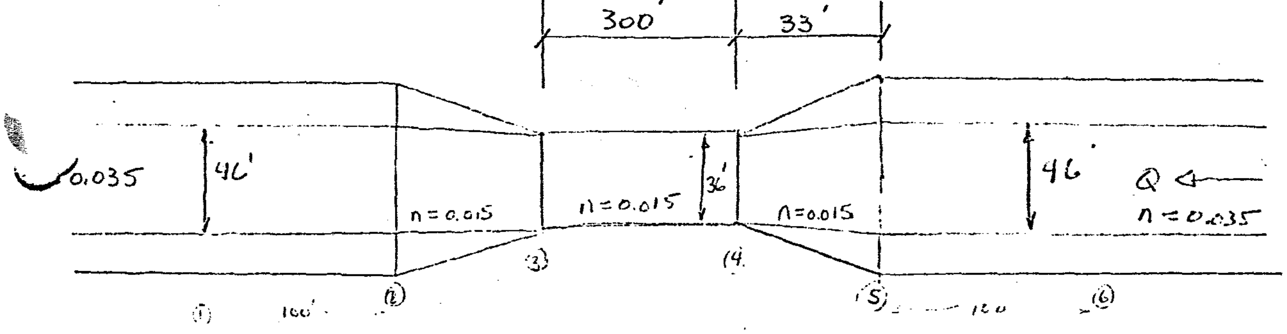
SIZE for Rectangular Box Culvert
present conditions show 2- 60" x 306' C.M.P.

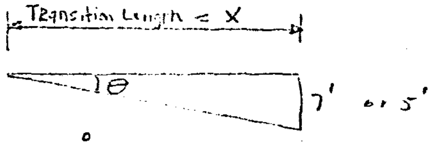
SIZE BOX for $Q_T = 4800$ c.f.s.

TRy Triple R.B.C.



TRy Triple 12' x height (allow for ½ ft F.B.)

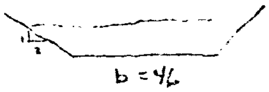




$\theta = 12°$

$$\therefore x = \frac{7}{\tan\theta} \doteqdot 33 \text{ feet}$$

① assume Elevation = 100.00 ft
b = 46 Z = 2:1
Q = 4800 CFS., n = 0.035



$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(4800)(0.035)}{(46)^{8/3}(0.0013)}$$

$= 0.1715$

$D/b = 0.2465$

$d_n = 11.34$

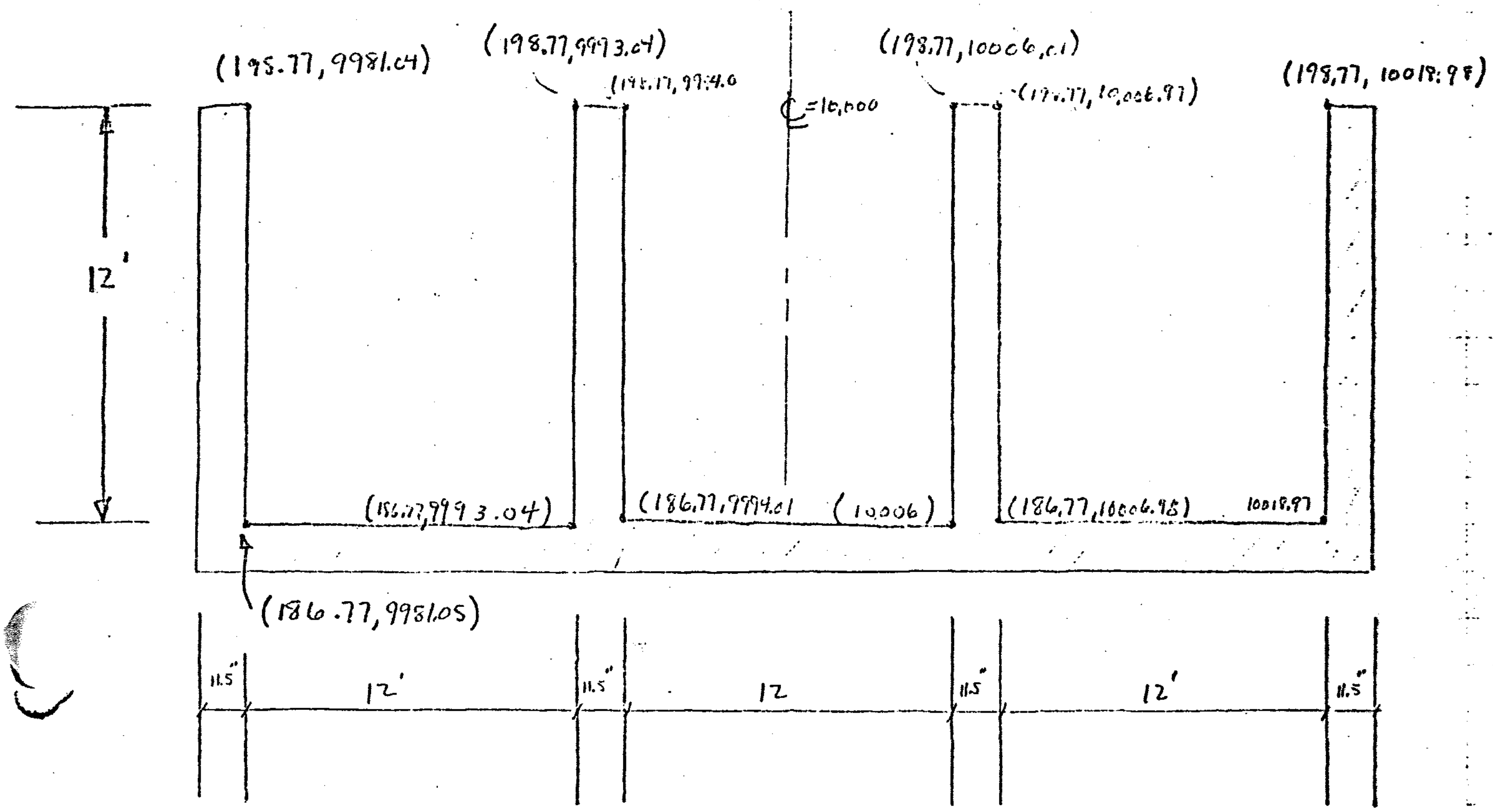
) EL. = 100.13'

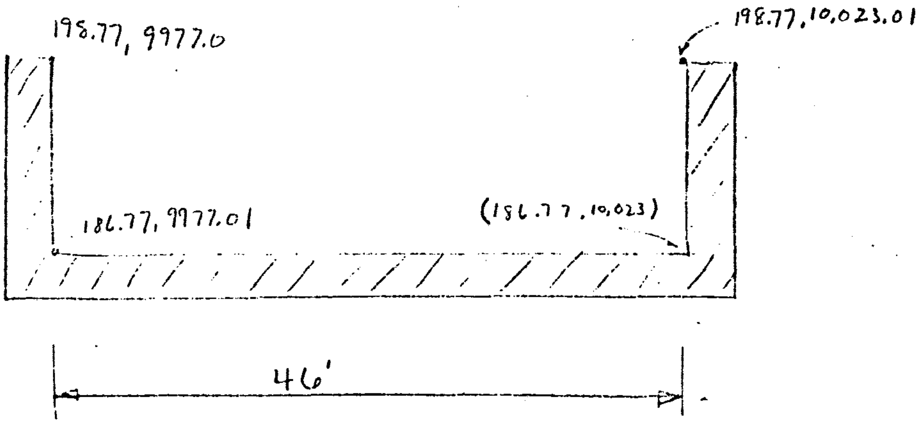
(5) EL = 100.61'

③ EL. = 100.17'

(6) EL. = 100.77'

STA 113+50

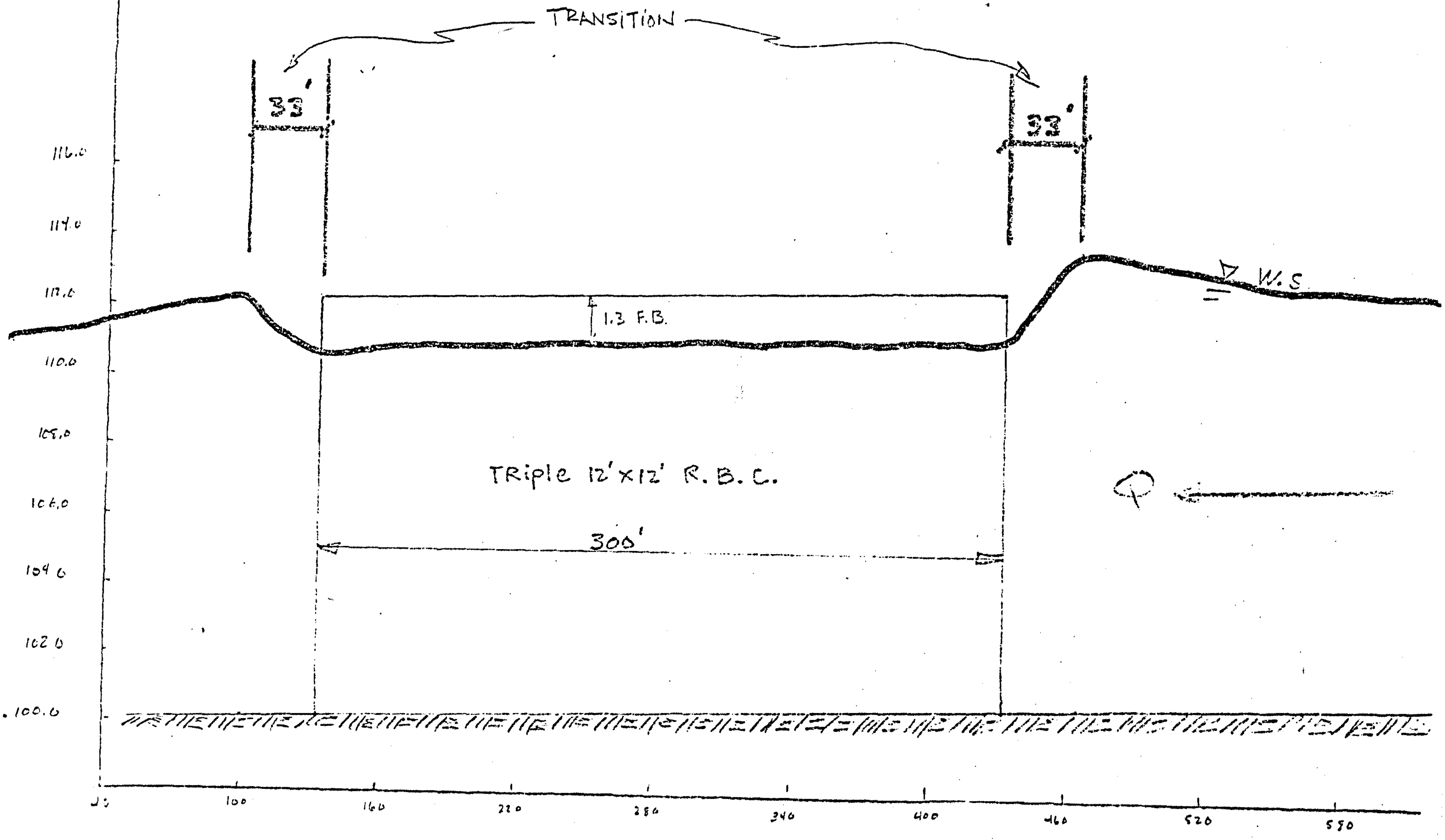




Try triple 12'x9' + Single 10'x9' BOX

LLAGAS, REACH 4
LEAVESLEY RO [illegible] POSED R.B.C.

B.K
3/20/81



Backwater Problem
Try adding 10' opening single Box

D.I. /160
4/8/81

```
STANDARD STEP METHOD

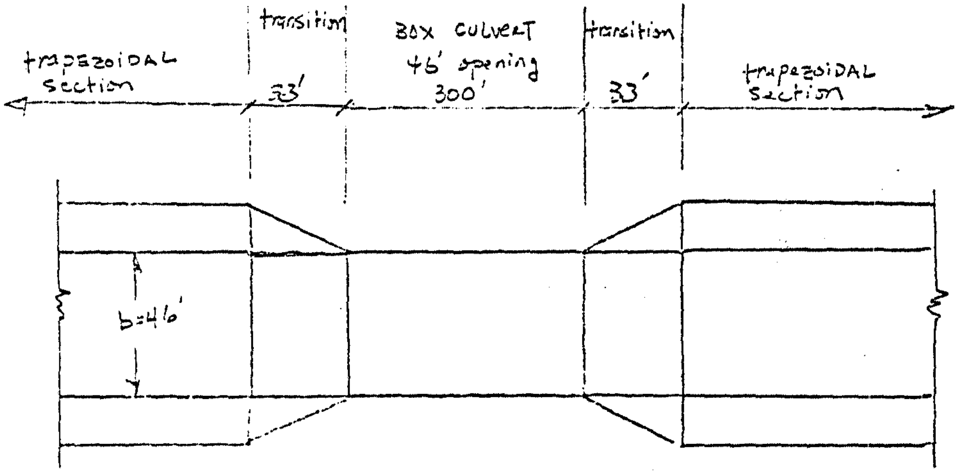
PROJECT   LLagas Creek, Reach 9, R.B.C. sizing

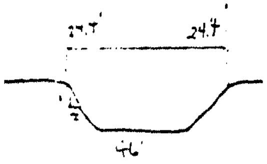
X  I  U     B    ZR   ZL     DEL X    EL       C     Q     N     Y      YC     A       V

1  1  1   46.00 2.00 2.00      .00 100.00   .00  4800 .0349 11.34   6.32  778.83   6.16
1  1  1   46.00 2.00 2.00   100.00 100.13   .00  4800 .0149 12.64   6.32  901.70   5.32
      1   36.00  .00  .00    33.00 100.17   .25  4800 .0149 11.34   8.20  408.56  11.74
      1   36.00  .00  .00   300.00 100.56   .00  4800 .0149 11.22   8.20  404.08  11.87
      1   46.00 2.00 2.00    33.00 100.61   .30  4800 .0149 13.57   6.32  992.57   4.83
1  1  1   46.00 2.00 2.00   100.00 100.74   .00  4800 .0349 12.64   6.32  901.69   5.32
      1   46.00 2.00 2.00   100.00 100.87   .00  4800 .0349 12.59   6.32  897.04   5.35
      1   46.00 2.00 2.00   100.00 101.00   .00  4800 .0349 12.55   6.32  892.49   5.37
      1   46.00 2.00 2.00   100.00 101.13   .00  4800 .0349 12.50   6.32  888.07   5.40
      1   46.00 2.00 2.00   100.00 101.26   .00  4800 .0349 12.46   6.32  883.77   5.43
      1   46.00 2.00 2.00   100.00 101.39   .00  4800 .0349 12.41   6.32  879.60   5.45
      1   46.00 2.00 2.00   100.00 101.52   .00  4800 .0349 12.37   6.32  875.55   5.48
      1   46.00 2.00 2.00   100.00 101.65   .00  4800 .0349 12.33   6.32  871.64   5.50
      1   46.00 2.00 2.00   100.00 101.78   .00  4800 .0349 12.29   6.32  867.86   5.53
      1   46.00 2.00 2.00   200.00 102.04   .00  4800 .0349 12.21   6.32  860.77   5.57
      1   46.00 2.00 2.00   200.00 102.30   .00  4800 .0349 12.14   6.32  853.95   5.62
      1   46.00 2.00 2.00   200.00 102.56   .00  4800 .0349 12.08   6.32  847.85   5.66
```

Leavesley Bridge

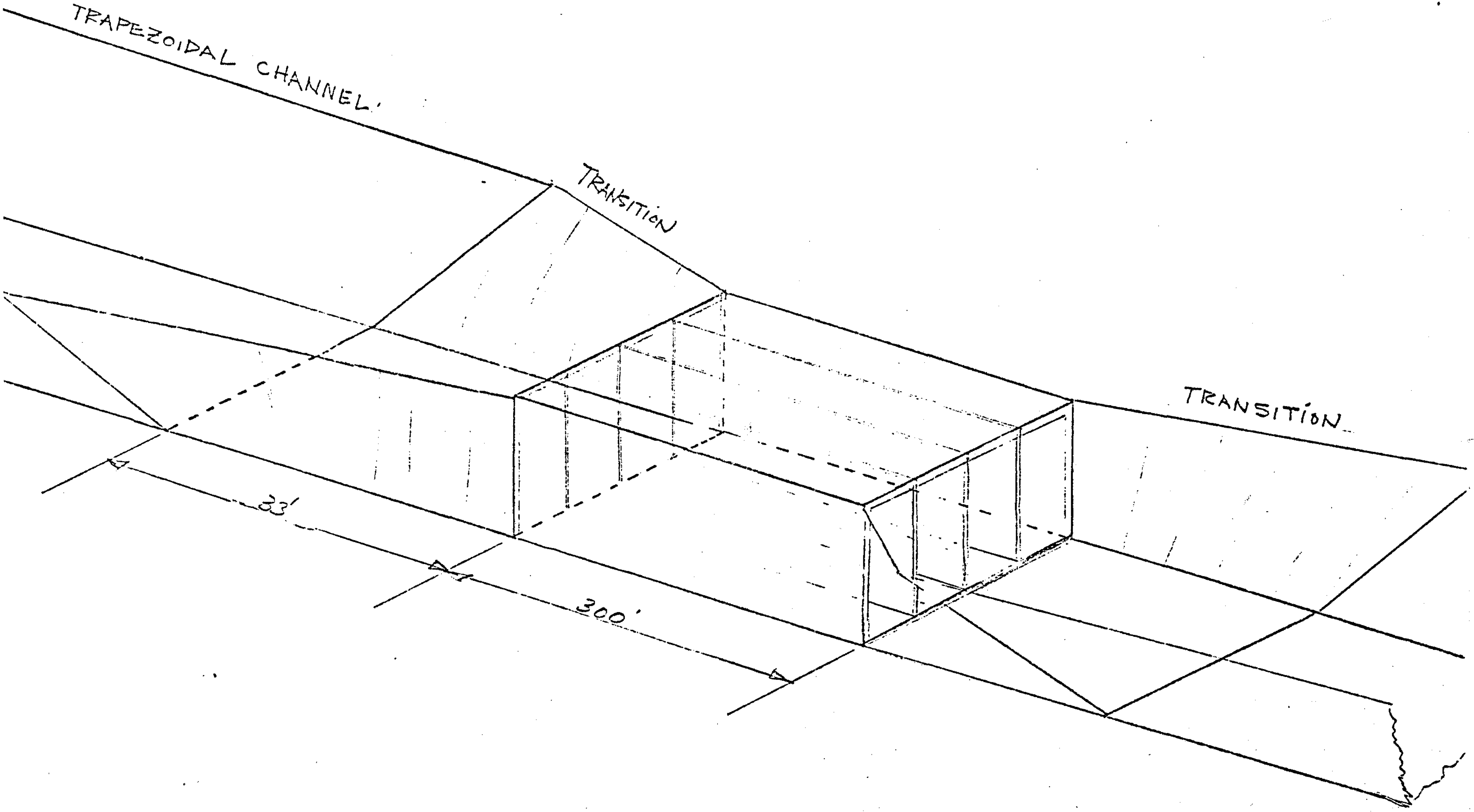
Triple 12'x12' R.C.B,
VOID, Backwater
too high





Triple 12'x9'
+ Single 10'x9'

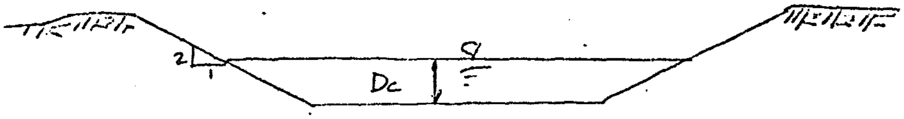
See Hec II summary


TRAPEZOIDAL CHANNEL.
TRANSITION
TRANSITION
33'
300'

14/
D.K
4/15/8

Sta 182+00 drop structure

$Q = 1840$ cfs
$S = 0.0013$ ft/ft
$n = 0.035$
$b = 40$ ft



$$K_c' = \frac{Q}{b^{5/2}} = \frac{1840}{40^{5/2}} = 0.1818$$

$$\frac{.10 - 0.09}{.1992 - .1683} = \frac{.10 - X}{.1992 - .1818}$$

$$X = \frac{D_c}{b} = 0.0944$$

$D_c = 3.78$ ft ⟶ Water Surf Elev. = 202.28

∴ tailwater Control

164

4/6/81

Revised R/W Cost

@ \$15,000/acre

$$= \left[(33)(150) + \left(\frac{58+47}{2}\right)(1100) + \frac{76+39}{2}(1140)\right]$$

= 2.33 acres

Cost Comparsion: Bridge and Box culvert

BOX CULVERT

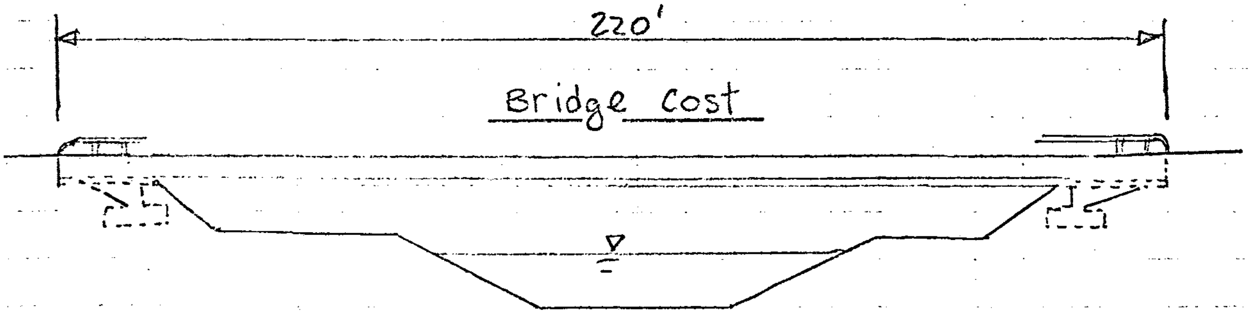
Triple 12'x12' Box culvert 6.18 CY/Linear ft of concrete required

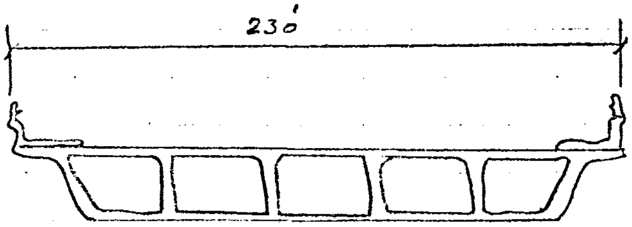
= 6.18 X 300 = 1854.0 Cubic Yards
@ \$ 305.00/C.Y

Total cost = \$565,470.00

$\boxed{\text{Triple Box + Single Box = \$ 760,365}}$

Bridge Cost





S.F. = (230)(220) = 50,600 s.f.
@ \$45 s f

Total cost = \$2,277,000 dollars

```
*************************************************************
NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

REACH9 CAPACITY CHECK
SUMMARY PRINTOUT

      SECNO          Q        CWSEL      XLBEL       VCH       XLCH      CRIWS        EG      K*XNCH     ELMIN      DEPTH      STCHL      STCHR

      0.000    6160.00     178.00     175.00      6.49       0.00       0.00    178.65      35.00    165.30      12.70     955.60    1072.00

    200.000    6160.00     178.27     189.00      6.39     200.00       0.00    178.90      35.00    165.50      12.77     928.00    1072.00

   1540.000    6160.00     179.84     179.10      6.15    1340.00       0.00    180.43      35.00    166.70      13.14     950.20    1072.00

   1780.000    6160.00     180.08     175.20      6.27     240.00       0.00    180.69      35.00    166.90      13.18     958.40    1072.00

   2270.000    6160.00     180.66     180.00      5.90     490.00       0.00    181.20      35.00    167.10      13.56     949.20    1072.00

   2640.000    6160.00     180.99     180.90      6.11     370.00       0.00    181.57      35.00    167.70      13.29     950.20    1072.00

   4310.000    6160.00     182.71     181.00      5.94    1670.00       0.00    183.26      35.00    169.20      13.51     951.40    1072.00

   4690.000    6160.00     183.00     184.00      5.92     300.00       0.00    183.55      35.00    169.50      13.50     946.00    1072.00

   4800.000    6160.00     183.60     187.20      0.00     110.00       0.00    183.60      35.00    169.62      13.98     939.84     939.84

SUMMARY OF ERRORS
```

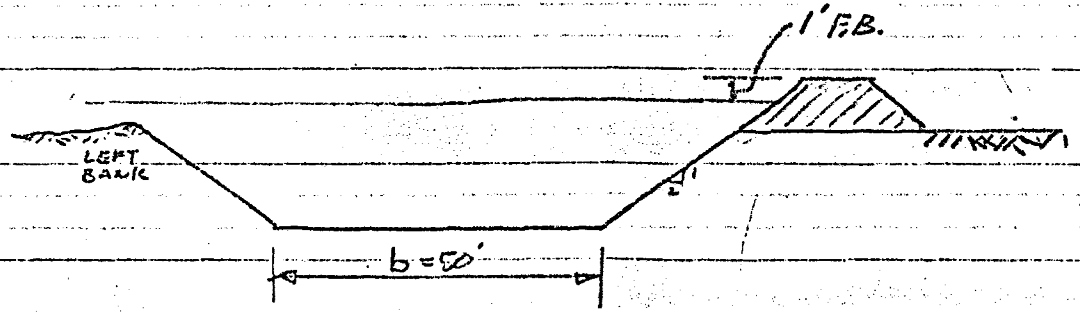
1

final

REACH 9

ALTERNATIVE F

STA 0+00 to Sta 48+00 (drop structure location)



165

BK.

```
                                                                        THIS RUN EXECUTED  4/ 3/81  16:11
**********************************************
 HEC2 RELEASE DATED NOV 76 UPDATED JULY1979
 ERROR CORR -  01,02,03
 MODIFICATION -  50,51,52
**********************************************

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST
```

final

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REACH9 CAPACITY CHECK
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WEST BRANCH Llagas REACH 9 STA 48+03 to Sta 110+80

```
SUMMARY PRINTOUT
```

ALTERNATIVE F

```
   SECNO        Q        CWSEL     XLBEL      VCH      XLCH     CRIWS      EG     K*XNCH     ELMIN     DEPTH     STCHL     STCHR

  4803.000   6160.00    183.60    187.30     9.03      3.00      0.00    184.87    35.00    173.80      9.80    948.00   1072.00

  5200.000   6160.00    184.96    186.00     8.10    397.00      0.00    185.98    35.00    174.30     10.66    951.60   1072.00

  5465.000   6160.00    185.29    186.95     8.14    265.00      0.00    186.31    20.00    174.66     10.63    950.42   1055.00

  5500.000   4800.00    185.83    187.00     5.98     35.00      0.00    186.38    20.00    174.71     11.12    950.42   1055.00

  5535.000   4800.00    185.84    187.04     5.99     35.00      0.00    186.40    20.00    174.75     11.09    950.42   1055.00

  5952.000   4800.00    186.11    189.20     6.21    452.00      0.00    186.71    35.00    175.32     10.79    947.24   1055.00

  6000.000   4800.00    186.14    189.20     6.50     48.00      0.00    186.79    35.00    175.32     10.82    947.32   1053.00

  6300.000   4800.00    186.60    189.59     6.45    300.00      0.00    187.25    35.00    175.71     10.89    947.32   1053.00

  6600.000   4800.00    187.06    189.98     6.39    300.00      0.00    187.69    \35.00   176.10     10.96    947.32   1053.00

  6900.000   4800.00    187.50    190.37     6.35    300.00      0.00    188.13    35.00    176.49     11.01    947.32   1053.00

  7200.000   4800.00    187.94    190.76     6.32    300.00      0.00    188.56    35.00    176.88     11.06    947.32   1053.00

  7500.000   4800.00    188.37    191.15     6.29    300.00      0.00    188.98    35.00    177
```

166

```
                                                                          35.00    175.32     10.82     947.3     053.00
                  189.59     6.46    300.00       0.00   18              35.00    175.71     10.89     947.32    053.00
   6600.  0   4800.00    187.06       98     6.39    300.00       0.00   187.69    35.00    176.10     10.96     947.32    053.00
   6900.000   4800.00    187.50    190.37     6.35    300.00       0.00   168.13    35.00    176.49     11.01     947.32   1053.00
   7200.000   4800.00    187.94    190.76     6.32    300.00       0.00   188.56    35.00    176.88     11.06     947.32   1053.00
   7500.000   4800.00    188.37    191.15     6.29    300.00       0.00   188.98    35.00    177.27     11.10     947.32   1053.00
   7800.000   4800.00    188.79    191.54     6.26    300.00       0.00   189.40    35.00    177.66     11.13     947.32   1053.00
   8100.000   4800.00    189.21    191.93     6.24    300.00       0.00   189.81    35.00    178.05     11.16     947.32   1053.00
   8400.000   4800.00    189.62    192.32     6.22    300.00       0.00   190.22    35.00    178.44     11.18     947.32   1053.00
   8700.000   4800.00    190.03    192.71     6.21    300.00       0.00   190.63    35.00    178.83     11.20     947.32   1053.00
   9000.000   4800.00    190.44    193.10     6.20    300.00       0.00   191.03    35.00    179.22     11.22     947.32   1053.00
   9300.000   4800.00    190.84    193.49     6.19    300.00       0.00   191.44    35.00    179.61     11.23     947.32   1053.00
   9600.000   4800.00    191.24    193.88     6.18    300.00       0.00   191.84    35.00    180.00     11.24     947.32   1053.00
   9900.000   4800.00    191.64    194.27     6.17    300.00       0.00   192.24    35.00    180.39     11.25     947.32   1053.00


     SECNO        Q       CWSEL     XLBEL      VCH      XLCH      CRIWS      EG     K*XNCH     ELMIN     DEPTH     STCHL     STCHR
  10200.000   4800.00    192.04    194.66     6.16    300.00       0.00   192.63    35.00    180.78     11.26     947.32   1053.00
  10500.000   4800.00    192.44    195.05     6.16    300.00       0.00   193.03    35.00    181.17     11.27     947.32   1053.00
  10800.000   4800.00    192.84    195.44     6.15    300.00       0.00   193.43    35.00    181.56     11.28     947.32   1053.00
  11080.000   4800.00    193.21    195.80     6.15    280.00       0.00   193.79    35.00    181.92     11.28     947.32   1053.00


SUMMARY OF ERRORS
```

B.K.

```
                                                                                    THIS RUN EXECUTED  4/15/81  11:45
**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED JULY1979
  ERROR CORR =  01,02,03
  MODIFICATION =  50,51,52
**************************************************

OTE= ASTERISK (*) AT LEFT OF CROSS=SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST
```

final

```
EACH9 CAPACITY CHECK
UMMARY PRINTOUT
```

WEST BRANCH LLAGAS   ALTERNATIVE F

STA 111+48 TO STA 182+00

```
      SECNO         Q      CWSEL     XLBEL      VCH     XLCH     CRIWS       EG    K*XNCH    ELMIN    DEPTH     STCHL     STCHR

  11148,000   4800,00     193,21    198,70    11,93     0,00      0,00   195,42     35,00   186,50     6,71    950,60   1053,00

  11317,000   4800,00     195,21    198,92     8,87   169,00      0,00   196,44     35,00   186,72     8,49    950,60   1053,00

  11350,000   4800,00     193,71    198,77    15,03    33,00    193,71   197,22     15,00   186,77     6,94   9977,00  10023,01
```

LEAVESLEY ROAD   TRIPLE + SINGLE RECTANGULAR BOX CULVERT (12'x9' + 10'x9')

```
  11650,000   4800,00     195,38    199,16    12,70   300,00      0,00   197,89     15,00   187,16     8,22   9977,00  10023,01

  11683,000   4800,00     197,35    199,20     7,05    33,00      0,00   198,12     35,00   187,20    10,15    951,00   1053,00

  11700,000   4800,00     197,38    199,22     7,04    17,00      0,00   198,15     35,00   187,22    10,16    951,00   1053,00

  11900,000   4800,00     197,79    199,48     6,90   200,00      0,00   198,53     35,00   187,48    10,31    951,00   1053,00

  12100,000   4800,00     198,17    199,74     6,80   200,00      0,00   198,89     35,00   187,74    10,43    951,00   1053,00

  12300,000   4800,00     198,53    200,00     6,71   200,00      0,00   199,23     35,00   188,00    10,53    951,00   1053,00

  12500,000   4800,00     198,88    200,26     6,64   200,00      0,00   199,57     35,00   188,26    10,62    951,00   1053,00

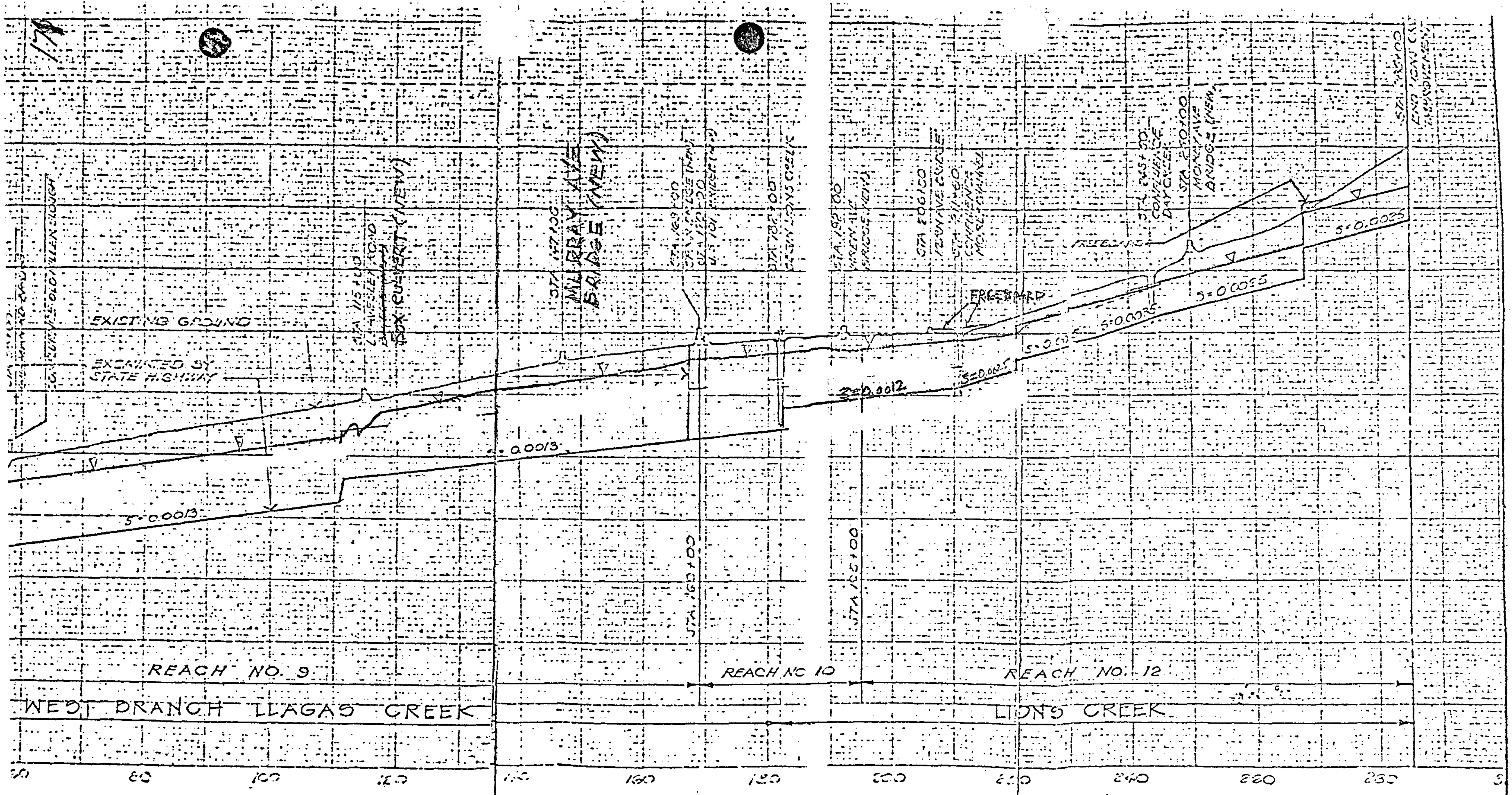
  12700,000   4800,00     199,22    200,52     6,58   200,00      0,00   199,89     35,00   188,52    10,70    951,00   1053,00

  12900,000   4800,00     199,55    200,78     6,52   200,00      0,00   200,21     35,00   188,78    10,76    951,00   10[illegible],00
```

```
[illegible]  [illegible]  [illegible]  [illegible]    6,64   200,00      0,00   199,57    35,00   188,26    10,62   951,00  10 3,00
 12700,00    4800,00   199,22    20               6,58   200,00      0,00   199,6     35,00     8,52    10,70   951,00     3,00
 12900,000   4800,00   199,55    200,78           6,52   200,00      0,00   200,21    35,00   188,78    10,76   951,00  1053,00
  3100,000   4800,00   199,86    201,04           6,47   200,00      0,00   200,51    35,00   189,04    10,82   951,00  1053,00
 13300,000   4800,00   200,17    201,30           6,43   200,00      0,00   200,82    35,00   189,30    10,87   951,00  1053,00
 13500,000   4800,00   200,48    201,56           6,40   200,00      0,00   201,11    35,00   189,56    10,92   951,00  1053,00
 13700,000   4800,00   200,78    201,82           6,37   200,00      0,00   201,41    35,00   189,82    10,96   951,00  1053,00
 13900,000   4800,00   201,07    202,08           6,34   200,00      0,00   201,70    35,00   190,08    10,99   951,00  1053,00
 14100,000   4800,00   201,36    202,34           6,32   200,00      0,00   201,98    35,00   190,34    11,02   951,00  1053,00
 14300,000   4800,00   201,65    202,60           6,30   200,00      0,00   202,27    35,00   190,60    11,05   951,00  1053,00
 14500,000   4800,00   201,94    202,86           6,28   200,00      0,00   202,55    35,00   190,86    11,07   951,00  1053,00


    SECNO        Q       CWSEL     XLBEL          VCH     XLCH      CRIWS      EG     K*XNCH    ELMIN     DEPTH    STCHL    STCHR

 14684,000   4800,00   202,01    203,10           6,40   184,00      0,00   202,65    15,00   191,10    10,91   951,00  1053,00
 MURRAY AVENUE, TRAP. SECTION REPLACES C.M.P.
  4716,000   4800,00   202,02    203,14           6,43    32,00      0,00   202,66    15,00   191,14    10,87   951,00  1053,00
 14900,000   4800,00   202,10    203,40           6,57   200,00      0,00   202,77    35,00   191,40    10,70   951,00  1053,00
 15100,000   4800,00   202,43    203,66           6,52   200,00      0,00   203,09    35,00   191,66    10,77   951,00  1053,00
 15300,000   4800,00   202,75    203,92           6,47   200,00      0,00   203,40    35,00   191,92    10,82   951,00  1053,00
 15500,000   4800,00   203,06    204,18           6,43   200,00      0,00   203,70    35,00   192,18    10,87   951,00  1053,00
 15700,000   4800,00   203,36    204,44           6,40   200,00      0,00   204,00    35,00   192,44    10,92   951,00  1053,00
 15900,000   4800,00   203,66    204,70           6,37   200,00      0,00   204,29    35,00   192,70    10,96   951,00  1053,00
 16100,000   4800,00   203,95    204,96           6,34   200,00      0,00   204,58    35,00   192,96    10,99   951,00  1053,00
 16300,000   4800,00   204,25    205,22           6,32   200,00      0,00   204,86    35,00   193,22    11,02   951,00  1053,00
 15300,000   4800,00   [illegible]
 15500,000   4800,00   203,06   204           6,43   200,00    0,00   203,7     35,00   192,18   10,87    951,00       ,00
 15700,000   4800,00   203,36   204,44        6,40   200,00    0,00   204,00    35,00   192,44   10,92    951,00   1053,00
 15900,000   4800,00   203,66   204,70        6,37   200,00    0,00   204,29    35,00   192,70   10,96    951,00   1053,00
 16100,000   4800,00   203,95   204,96        6,34   200,00    0,00   204,58    35,00   192,96   10,99    951,00   1053,00
 16300,000   4800,00   204,25   205,22        6,32   200,00    0,00   204,86    35,00   193,22   11,02    951,00   1053,00
 16500,000   4800,00   204,53   205,48        6,29   200,00    0,00   205,15    35,00   193,48   11,05    951,00   1053,00
 16900,000   4800,00   205,10   206,00        6,26   400,00    0,00   205,71    35,00   194,00   11,10    951,00   1053,00
 16930,000   4800,00   205,17   208,00        5,97    30,00    0,00   205,73    15,00   194,02   11,15   9947,04  10052,36
 16950,000   4800,00   205,18   208,03        5,98    20,00    0,00   205,73    15,00   194,05   11,13   9947,04  10052,36
 17050,000   4800,00   205,19   208,16        6,07   100,00    0,00   205,76    15,00   194,18   11,01   9947,04  10052,36
 17070,000   4800,00   205,19   208,18        6,09    20,00    0,00   205,76    15,00   194,20   10,99   9947,04  10052,36
 17100,000   4800,00   205,20   208,22        6,11    30,00    0,00   205,78    35,00   194,24   10,96   9947,04  10052,36
 17200,000   4800,00   205,33   208,35        6,11   100,00    0,00   205,91    35,00   194,37   10,96   9947,04  10052,36
 17300,000   4800,00   205,46   208,48        6,11   100,00    0,00   206,04    35,00   194,50   10,96   9947,04  10052,36
 17400,000   4800,00   205,59   208,61        6,11   100,00    0,00   206,17    35,00   194,63   10,96   9947,04  10052,36
 17500,000   4800,00   205,72   208,74        6,11   100,00    0,00   206,30    35,00   194,76   10,96   9947,04  10052,36
 17600,000   4800,00   205,85   208,87        6,11   100,00    0,00   206,43    35,00   194,89   10,96   9947,04  10052,36
 17700,000   4800,00   205,98   209,00        6,11   100,00    0,00   206,56    35,00   195,02   10,96   9947,04  10052,36
 17800,000   4800,00   206,11   209,13        6,11   100,00    0,00   206,69    35,00   195,15   10,96   9947,04  10052,36
 17900,000   4800,00   206,24   209,26        6,11   100,00    0,00   206,82    35,00   195,28   10,96   9947,04  10052,36
 18000,000   4800,00   206,37   209,39        6,11   100,00    0,00   206,95    35,00   195,41   10,96   9947,04  10052,36
 18100,000   4800,00   206,50   209,52        6,11   100,00    0,00   207,08    35,00   195,54   10,96   9947,04  10052,36
 18200,000   4800,00   206,63   209,65        6,11   100,00    0,00   207,21    35,00   195,67   10,96   9947,04  10052,36
```



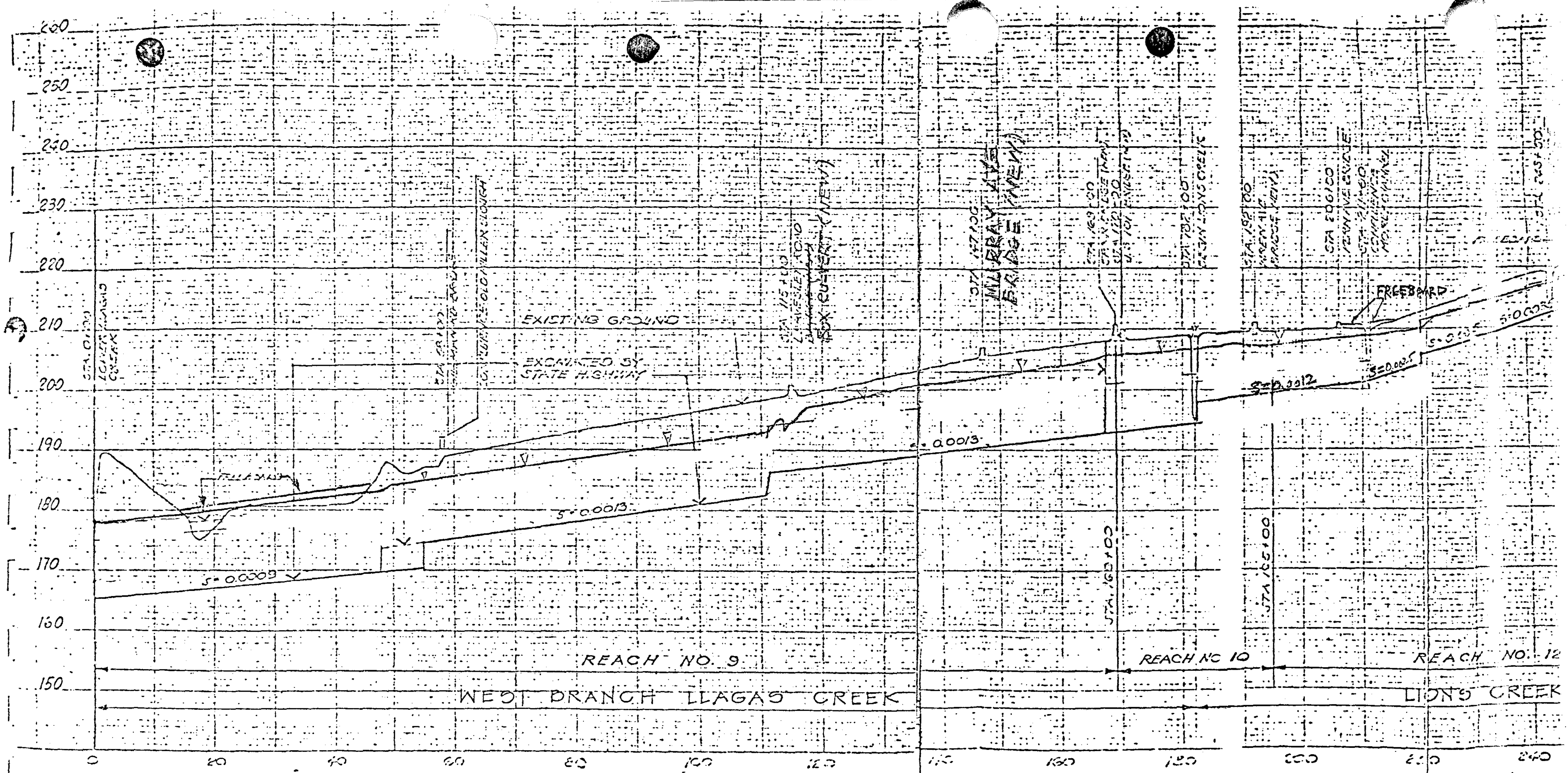
REVISED

LLAGAS CREEK

WORK PLAN

REVISED PROFILE

REACHES 9, 10 & 12



1981 APR 20 PM 2:30

LL

RI

REA

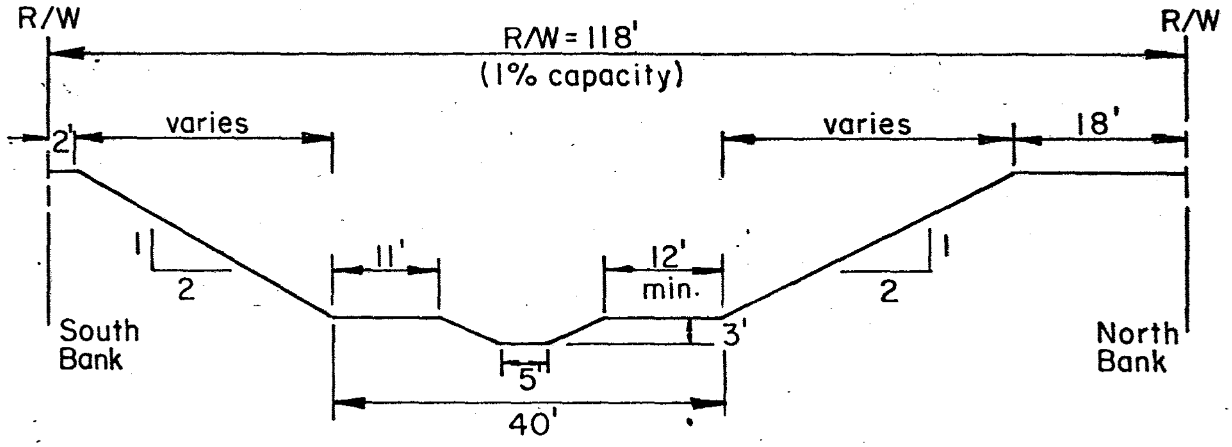
REVISED

172

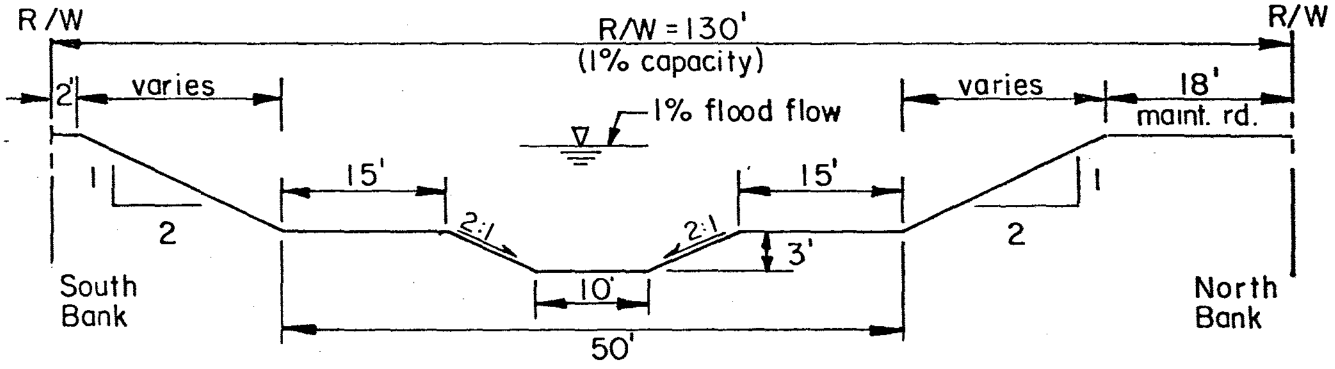
Reach 10

Reach 10 extends from station 169+00 to station 182+00 on West Branch Llagas and from station 182+00 to 195+00 on Lions Creek. This is an earth trapezoidal channel, carries a 100 year Q, and incorporates a low flow channel. A drop structure is required at station 182+00.

WEST BRANCH LLAGAS CREEK AND A PORTION OF LIONS CREEK



STA. 182+00 (confl. w/ Lions Cr.) To STA. 195+00 (100' u/s Wren Avenue)



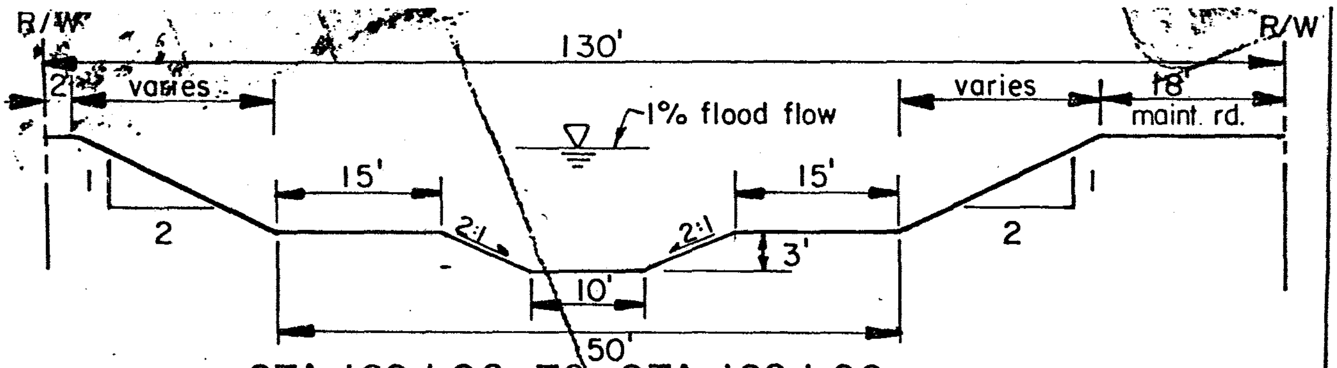
STA 169+00 (Monterey Rd.) To STA 182+00 (confl. w/ Lions Cr.)

MONTEREY RD. TO 100' UPSTREAM OF WREN AVENUE

REACH 10

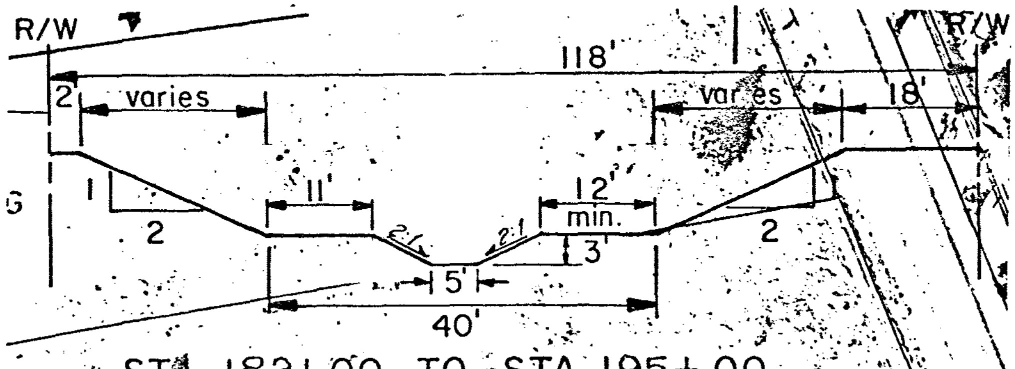
FIGURE 12

REACH 10



STA 169+00 TO STA 182+00

WEST BRANCH LLAGAS CREEK
(LOOKING UPSTREAM)



STA 182+00 TO STA 195+00

LIONS CREEK
(LOOKING UPSTREAM)

Ok [illegible]

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 10 S/a 169+00—195+00 case 9

Item	Quantity	Unit Cost	$
Channel Excavation	95,238	2.80	266,666
Compacted Embankment			
Drop Structures	237 C.Y.	350 C.Y.	82,950
Drainage Inlets	1 ea	6000 ea.	6,000
Riprap			
er Stone			
Seeding			
Landscaping		3%	10,910
Structural Excavation			
Rectangular Concrete Channel			
Compacted Backfill			
Levee Embankment			
Site Prepar~~ation~~ [illegible] (Levees)	7.0 ac	1150	8050
Mobilization		3%.	~~11,237~~ 11,237

Subtotal 385,813

~~10~~/12
~~1~~5% Contingency 46,298

TOTAL 432,111

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

REACH NO. 10 Sta. 169+00 — 195+00

Item	Quantity	Unit Cost	$
State and County Bridges	17,200	45 S.F.	774,000
Private Bridges			
~~RCB Culverts~~ FENCE	1000 l.f.	6	6000
Relocation of Utilities			1,400

Subtotal	781,400
~~15~~ 12% Contingency	93,768
TOTAL	875,168

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	-0-		
Agricultural			
Potential Residential (low value)			
Potential Residential (medium value)	3.9	15,000	58,500
Residential/School			
Dwellings			

TOTAL 58,500

Calif

L.L. Hansen 7/22/81

Reach 10

Lower Llagas

169+00 - 182+00

Aged

```
WP PROG      1
    DATA
     4800.        Q1
        11.        D
        50.        B
         2.        Z
    0.0013         S
     0.035         N
     RUN
        94.        T
       792.        A
7.984394501        R
4843.310149       Q2
6.115290593        V
 Q1/Q2 RATIO
.9910577378
     END
```

As Built

```
WP PROG      1
    DATA
     2700.        Q1
        6.6        D
        50.        B
         2.        Z
    0.0013         S
     0.025         N
     RUN
       76.4        T
     417.12        A
5.245730288        R
2698.871014       Q2
  6.4702508        V
 Q1/Q2 RATIO
1.000418318
     END
```

182+00 - 195+00

```
WP PROG      1
    DATA
     1840.        Q1
        7.4        D
        40.        B
         2.        Z
    0.0012         S
     0.035         N
     RUN
       69.6        T
     405.52        A
 5.54793931        R
1869.138433       Q2
4.609238589        V
 Q1/Q2 RATIO
.9844107681
     END
```

```
WP PROG      1
    DATA
     1050.        Q1
        4.4        D
        40.        B
         2.        Z
    0.0012         S
     0.025         N
     RUN
       57.6        T
     214.72        A
3.598012086        R
1038.126636       Q2
4.834792455        V
 Q1/Q2 RATIO
1.011437298
     END
```

LLAGASA LLAGAS CREEK - REACH 10

sta 169+00 - 182+00 Q = 4800 cfs

$b = 80'$ $S = .0012$ (Work plans use 80')

$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(4800)(.035)}{(.036)(118824)} = .039$$

$$\frac{D_n}{b} = .11 \quad D_n = 8.8$$

$$V = \frac{Q}{A} = \frac{4800}{859} = 5.59 \text{ fps}$$

F.B = .2 (9) = 1.85' use 2'

☆ use b = 50' (same as D/s channel) ☆

sta 182+00 - 195 Q = 1840

$n = .035$
$S = .0013$
$b = 40$ (Assume)

$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(1840)(.035)}{(18713)(.036)} = .096$$

$$\frac{D_n}{40} = .18 \quad D_n = 7.2$$

check Backwater from Reach 9 Void

$b = 50$ $S = .0013$ $Q = 6160$ 1%

$$K' = \frac{Q\,n}{b^{8/3} S^{1/2}} = \frac{(4800)(.035)}{(33930)(.036)} = 0.138$$

Void

$$\frac{D_n}{b} = 0.22 \quad D_n = 11'$$

$$V = \frac{Q}{A} = \frac{4800}{792} = 6.$$

$$K'_c = \frac{Q}{b^{5/2}} = \frac{4800}{17678} = 0.27 \checkmark$$

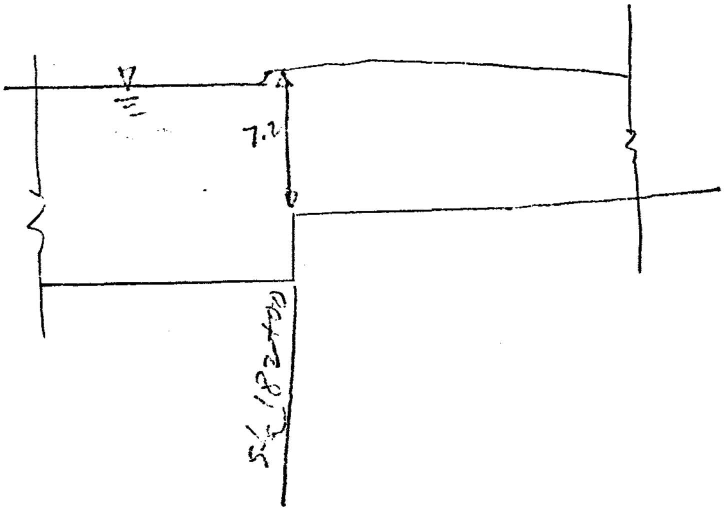
$$\frac{D_c}{b} = 0.12 \quad D_c = 6'$$

```
STANDARD STEP METHOD

PROJECT [illegible] REACH [illegible]

X  I  U     B     ZR    ZL     DEL X    EL      C     Q     N      Y      YC     A        V

1  1  1   40.00 2.00 2.00      .00 198.50  .00  1840 .0349  7.20  3.77  391.68   4.69 Sta[illegible]
      1   40.00 2.00 2.00  1300.00 200.06  .00  1840 .0349  7.27  3.77  397.14   4.63
      1   40.00 2.00 2.00  1600.00 201.98  .00  1840 .0349  7.31  3.77  399.50   4.60 [illegible]+00
1  1  1   20.00 2.00 2.00    45.00 202.09  .10   950 .0349  7.55  3.63  265.15   3.58 [illegible]
      1   20.00 2.00 2.00   855.00 204.23  .00   950 .0349  6.35  3.63  207.69   4.57 [illegible]
```



Computi[illegible]
Up St.
Dn. St. ____

STANDARD STEP METHOD

WANG

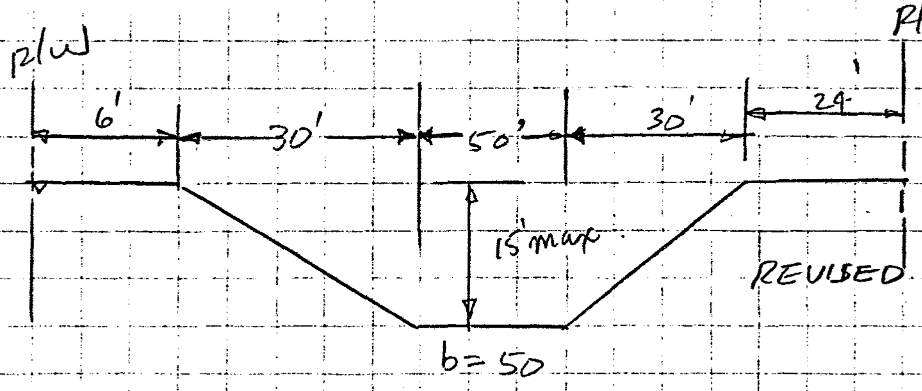
Project [illegible] Name ____ Date ____

(1) X	(2) I	(3) b	(4) Z_R	(5) Z_L	(6) ΔX	(7) El	(8) C	(9) Q	(10) n	(11) y	(12) $\frac{A^3}{T}-\frac{Q^2}{g}$
1	1	40	2	2	0	198.5	0	1840	.035	8.8'	Sta 1824+00
0	0	40	2	2	1300	200.06	0				Sta 1954+00
0	0	40	2	2	1600	201.93	0				2114+0
1	0	20	2	2	45'	203.09	0.1	950			transition
0	0	20	2	2	855	204.23	0				Sta 220

LLAGAS CREEK – REACH 10

2/9/81
Ty 183

R/w Req.
Sta 169+00 — 182+00



REVISED

R/w Width = 130'

R/w to be Acq

$130 \times 1300 \frac{1}{43560} = \boxed{3.9 \text{ Ac}}$

Areas to be Cleared $\boxed{3.9 \text{ Ac}}$

Channel Excavation

Vol = 44.4 CY/l.f
1.7

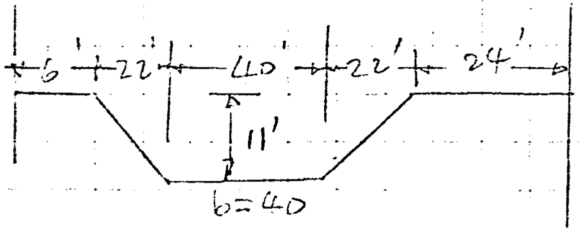
$44.4 \times 1300 = \boxed{57720 \text{ C.Y.}}$ +

Low flow C. $1.78 \times 1300 = \boxed{2314 \text{ C.Y.}}$

Drainage inlet 1 ea from work plans

No seeding

Sta 182+00 — 195+00
R/w Req



Revised

R/w = 114' use 115'

sht 4 of

2-9-81

LLAGAS CREEK — REACH 10

R/w to be Acq None Dist owns it

Channel Exc

$25.3\text{ c.y/l.f} \times 1300 = \boxed{32890\text{ c.y}}$

$1.78 \times 1300 \times \quad = \boxed{2341\text{ c.y}}$

Area to be cleared $104 \times 1300 \times \frac{1}{43560} = \boxed{3.1\text{ Ac}}$

Bridges

@ Montery Av & Wren Ave

Wren 94' x 40 = 3760 S.F

Montery 112' x 120' = 13440

17,200 S.F

Fences

1000' of Road crossing only

Drop structure 1 ea

Reduction in Costs due to

1. Maint Rd on 1 side only
2. Reduce fencing (at Road crossings only)
3. no seeding
4. Reduce unit price on channel ex.
5. Mobilization from 6% to 3%

dLc

B.

```
                                   THIS RUN EXECUTED  4/16/81  11:42
```

final

```
************
HEC2 RELF
ERROR
MODIF
*****

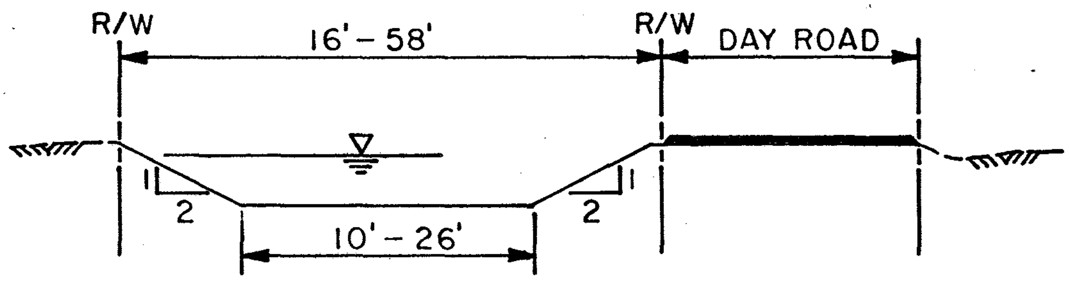
 MESSAGE IN SUMMARY OF ERRORS LIST

         CRIWS       EG     K*XNCH     ELMIN     DEPTH      STCHL     TCHR
)0        0,00   206,88      35,00    198,50      8,13    9958,40 100 1,60
)0        0,00   207,23      35,00    199,02      7,94    9959,44 100 ,56
)0        0,00   207,61      35,00    199,54      7,78    9960,28 100 ,72
)0        0,00   207,68      15,00    199,78      7,60    9957,56 100 2,44
)0        0,00   207,69      35,00    199,82      7,57    9957,64 100 2,36
)0        0,00   207,73      35,00    199,87      7,55    9960,53 10039,47
)0        0,00   208,00      35,00    200,19      7,50    9961,18 10038,82
)0        0,00   208,22      35,00    200,49      7,58    9961,18 100 8,82
)0        0,00   208,46      35,00    200,79      7,35    9961,62 100 8,38
)0        0,00   208,76      35,00    201,09      7,35    9962,18 100 7,82
)0        0,00   208,93      15,00    201,49      7,08    9962,98 100 7,02
          0,00   208,94      35,00    201,53      7,05    9963,06 100 6,94
```

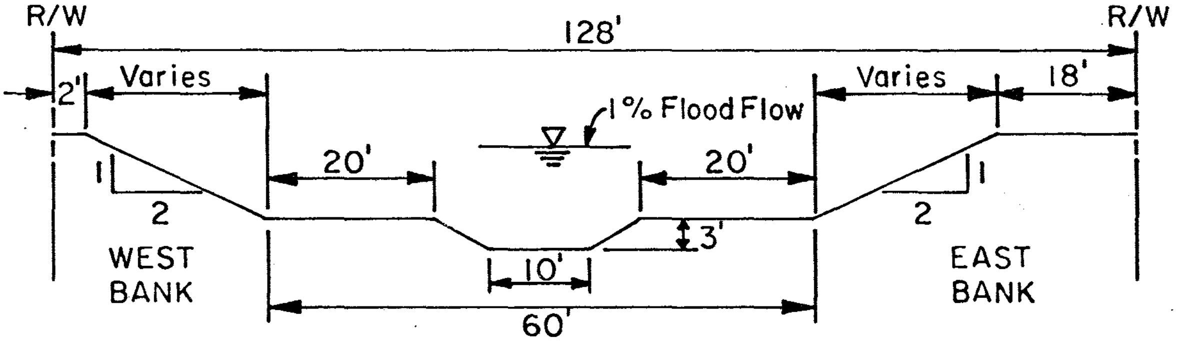
185

Reach 11a extends from station 182+00 to 220+00 on West Branch Llagas Creek. This is a trapizoidal earth channel with a drop structure to assure bottom stability. One bridge is required at Day Road. A collector ditch on each side of West Branch parallel with Day Road will train overland flows into the system. The drop proposed st Day Raod is moved to the confluence of Lions Creek. Construction ends at the confluence of the collector dithhes and West Branch/

WEST LITTLE LLAGAS CREEK



TYPICAL INTERCEPTER CHANNEL ALONG N. SIDE OF DAY ROAD



Sta. 182+00 (Confl. w/ Lions Creek) to Sta. 220+00 (Day Road)

CONFLUENCE WITH LIONS CREEK TO DAY ROAD

REACH 11a

FIGURE 13

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 11A sta 182+00 – sta 220+00 case 9

Item	Quantity	Unit Cost	$
Channel Excavation	116,764	2.80	326,939
Compacted Embankment	270 C.Y.	350 C.Y.	94,500
Drop Structures	4ea	6000 ea	24,000
Drainage Inlets	205 C.Y.	40 C.Y.	8,200
Riprap	Day Rd 176 C.Y.	40	7050
er Stone	(Ditch excavation) Day Rd etc 16635 C.Y.	2.8	46579
S ing			
Landscaping		3%	15004 ~~13,996~~
Structural Excavation			
Rectangular Concrete Channel			
Compacted Backfill			
Levee Embankment			
Site Preparation (~~Levees~~)	11.2 ac	1150	12,880
Mobilization		3 ~~6~~%	16,5 ~~14415~~ ~~16,07~~

Subtotal ~~494,930~~ ~~551825~~ 552,307

10 12
~~15%~~ Contingency ~~59,391~~ ~~6624~~ 66277

TOTAL ~~554,322~~
~~618044~~
618,584
~~60565~~
~~698109~~

double count

{~~Side channel~~/
{at Day Rd

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 11A sta 182+00 — sta 220+00

Item	Quantity	Unit Cost	$
State and County Bridges	7929 S.F	45 S.F.	356,805
Private Bridges			
Barbed Wire Fence	~~7500~~ 200	6 L.F.	~~45000~~ 1200
Relocation of Utilities			1,400

Subtotal ~~403,805~~ 358,005

~~15~~ 12% Contingency ~~60,571~~ 42,961

TOTAL ~~464,376~~ 400,966

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.31	200 AC	262
Agricultural			
Potential Residential (low value)			
Potential Residential (medium value)	~~6.2~~ 3.88	20000	~~124,000~~ 77600
Residential/School	Day Rd 2.36	15000	35400
Landscaping Addition			

TOTAL ~~124,262~~ ~~77862~~ 113,262

Side change/
at [illegible]

+ 35437
$148,699

Calif
LL Hansen 7/22/81
Keach 11a

Lower Llagas

182+00 - 220+00

Aged

```
   WP PROG     1
      DATA
       2340.        Q1
           6.7       D
           60.       B
            2.       Z
      0.0013         S
        0.035        N
        RUN
          86.8       T
       491.78        A
5.466450657          R
2336.129563         Q2
4.750354962          V
 Q1/Q2 RATIO
1.001656773
        END
```

As Built

```
   WP PROG     1
      DATA
       1280.        Q1
          3.9        D
          60.        B
           2.        Z
      0.0013         S
       0.025         N
       RUN
         75.6        T
      264.42         A
3.414455811          R
1284.968384         Q2
4.859573345          V
 Q1/Q2 RATIO
.9961334582
       END
```

Drop Structure at Sta 182+00

Q = 2340 cfs

Concrete Vol From DMJM — Standard B drop 270 cy

LLAGAS CREEK – West Branch

Reach II A Sta 182+00 – 220+00

Notes:

1 ~~Seeding~~ no seeding

sta 182 – 197+00

$96 \times 1500 \times \frac{1}{43560} = 3.3$ Ac

sta 197+00 – 220+00

$104 \times 2300 \times \frac{1}{43560} = 5.5$

Total area to be seeded = 8.8 Ac

2 Bridge at Farrell & Day

Farrell 102' × 40 = 4030

Day 96 × 40 = 3840

7920 S.F.

3 Utilities

1975 800

↑14%/yr 1980 560

1360 use $1400

4 Clearing $128 \times 3800 \times \frac{1}{43560} = \boxed{11.2 \text{ Ac}}$

5 fencing only at Road crossings

100' for each road crossings

LLAGAS CREEK — West Branch

10/14/80

$\frac{1}{y}$ 194

REACH II A Sta 182+00 — 220+00

$Q_{1\%} = 2340$ cfs sta 182+00 — 197+00 original

$Q_{1\%} = 2070$ cfs sta 197+00 — 220+00. ($Q_{1\%} = 2$

$s = .0013$

Try $b = 50'$

$$K' = \frac{Qn}{b^{8/3} s^{1/2}} = \frac{(2340)(.035)}{(33930)(.036)} = .067$$

$\frac{D_n}{b} = 0.15$ $D_n = 7.5'$ no Freeboard

Try $b = 60'$

$$K' = \frac{Qn}{b^{8/3} s^{1/2}} = \frac{(2340)(.035)}{(55174)(.036)} = .04$$

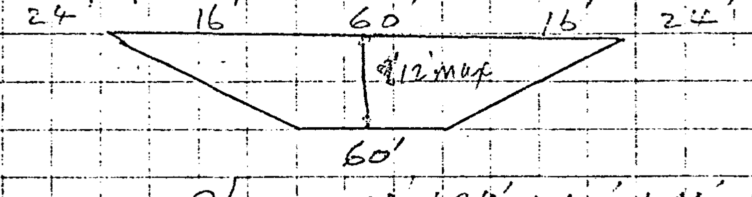
$\frac{D_n}{b} = 0.11$ $D_n = 6.6$ $V = \frac{Q}{A}$

$R = \frac{A}{P} = \frac{483}{89.5} = 5.4$ $= \frac{2340}{483} =$

$F.B = \left[\frac{V^2}{2g} + D\right] 0.2 = 1.4$ use 1.5'

Total channel depth $1.5' + 6.6 = 8.1'$ O.K

R/W Req.



R/W = ~~24' + 26' + 60' + 24' + 24' = 145'~~ 138' ~~use 14~~

use 123' ~~use 145'~~ Vo

Sta 197+00 → 220+00

$Q_{1\%} = 2070$ cfs

Try $b = 50'$ $s = .0013$

$$K' = \frac{Qn}{b^{8/3} s^{1/2}} = \frac{(2070)(.035)}{(33929)(.036)} = .059$$

$R = \frac{A}{P} = \frac{443}{91.3} = 4.9$ $\frac{D_n}{b} = 0.14$ $D_n = 7'$ o.k $V = \frac{Q}{A} = \frac{20}{44}$

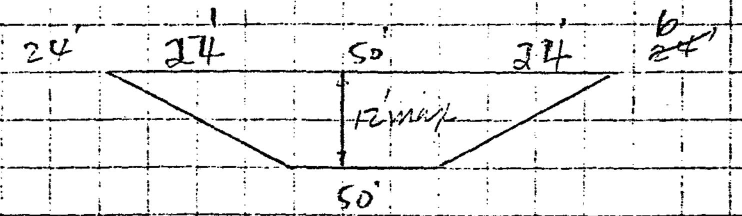
$= 4.6$

$F.B = \left[\frac{V^2}{2g} + D\right] 0.2 = 1.5'$

LLAGAS CREEK - West Branch

Reach 11A

R/W Req



R/W = 24 + 17 + 50 + 17 + 24 = $\boxed{\cancel{146'}}$ void.

Reduce from 146 to 130'

R/W to be Acq

sta 182 — 193 + 00 (Farrell Ave)

$[\overset{28}{\cancel{146}} - 30'] \times 700 \times \frac{1}{43560} = \boxed{\cancel{1.9\ Ac}}\ \boxed{1.58\ Ac}$

See also 11B for R/W to be Acq.

Excavation

sta 182 — 197 + 00

Excavation (C.Y.) $= \frac{(92+60)(8)}{2} \times 1 \times \frac{1}{27} \times 150$

See Cross section p11

= 33,777 C.Y. use $\boxed{34000}$

sta 197 — 220

Excavation (C.Y.) $= \frac{(98+50)(12)}{2} \times 1 \times \frac{1}{27} \times 2$

= 75,644 use $\boxed{76000}$

Low flow C. 1.78 C.Y./l.f. × 3800 = $\boxed{6,764\ C.Y.}$

Void

$27 \times 500' \times \frac{1}{43560} = 0.31$

$37 \times 500 \times \frac{1}{43560} = 0.42$

$74 \times 350 \times \frac{1}{43560} = 0.59$

$140 \times 770 \times \frac{1}{43560} = 2.5$

$4 \times 980 \times \frac{1}{43560} = .09$

3.91

+ 1.77

5.68

Less [illegible] 1.31

4.37

LLAGAS CREEK — IIA

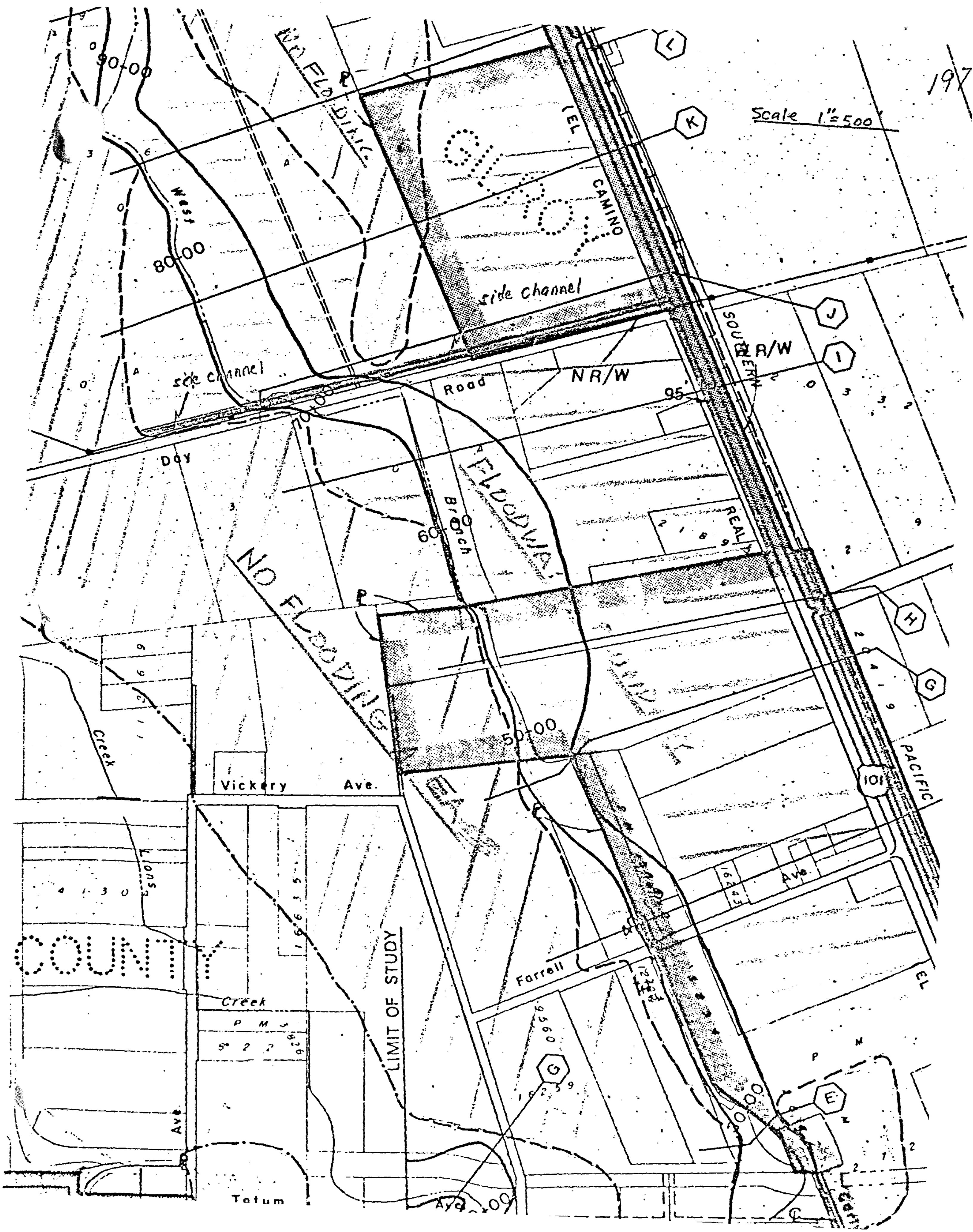
3-8/81
Ty 196

R/W to be Acq

$$90 \times 700 \times \frac{1}{43560} = \boxed{1.45\ \text{AC}}$$
$$70 \times 920 \times \frac{1}{43560} = \boxed{1.45\ \text{AC}}$$
$$128 \times 780 \times \frac{1}{43560} = \boxed{2.29\ \text{AC}}$$

5.19 Ac.
Less Crk bottom 1.31

$\boxed{3.88\ \text{AC}}$


Scale 1"=500'
L
K
J
I
H
G
E
G
90+00
80+00
60+00
50+00
West
Branch
side channel
side channel
GILROY
EL CAMINO REAL
SOUTHERN PACIFIC
R/W
NR/W
95
Road
Day
FLOODWAY
NO FLOODING
NO FLOODING
Vickery Ave.
Creek
Llagas
COUNTY
Creek
Farrell
Ave.
Ave
Tatum
Ave
LIMIT OF STUDY
101
EL

ALTERNATE III
Side Channel along Day Rd.

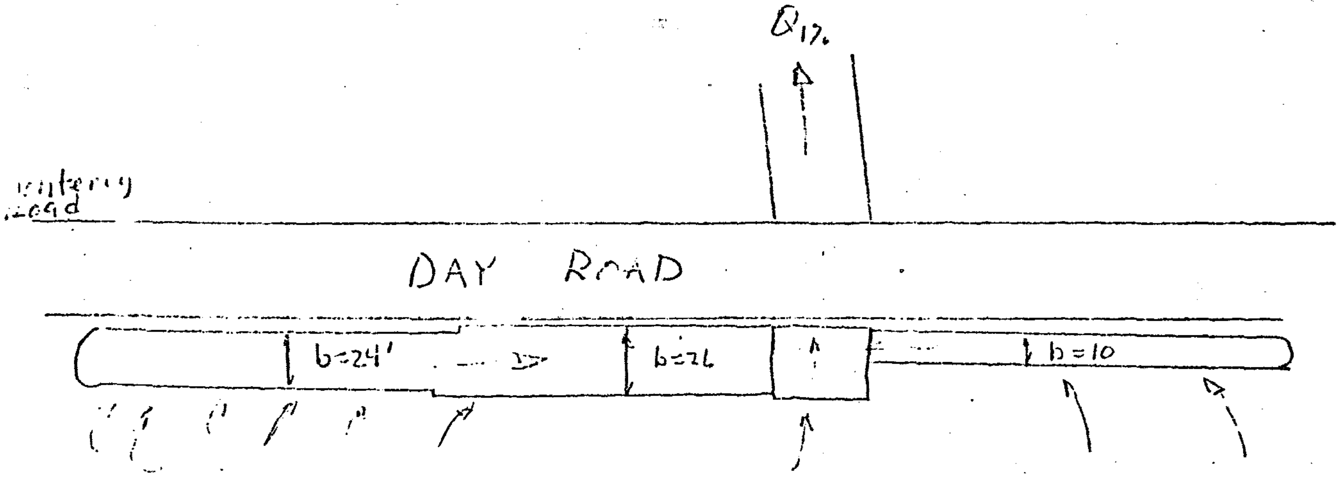
Estimated cost for project

EXCAVATION cost = 16,635.2 cu yd @ \$2.80/cy ⟶ \$ 46,579

rock lining + Filter cost = 176.3 @ \$40/cy ⟶ 7,050

R/W cost = 2.36 acres @ \$15,000/ac ⟶ 35,437

\$ 89,066

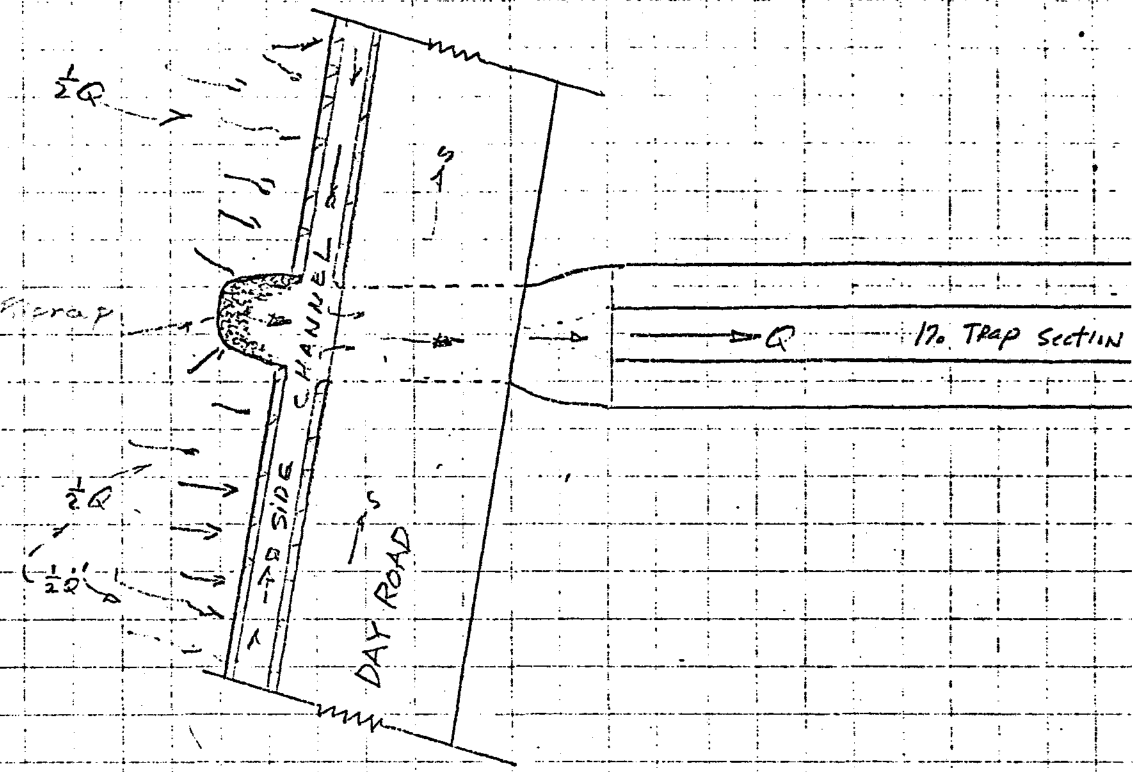


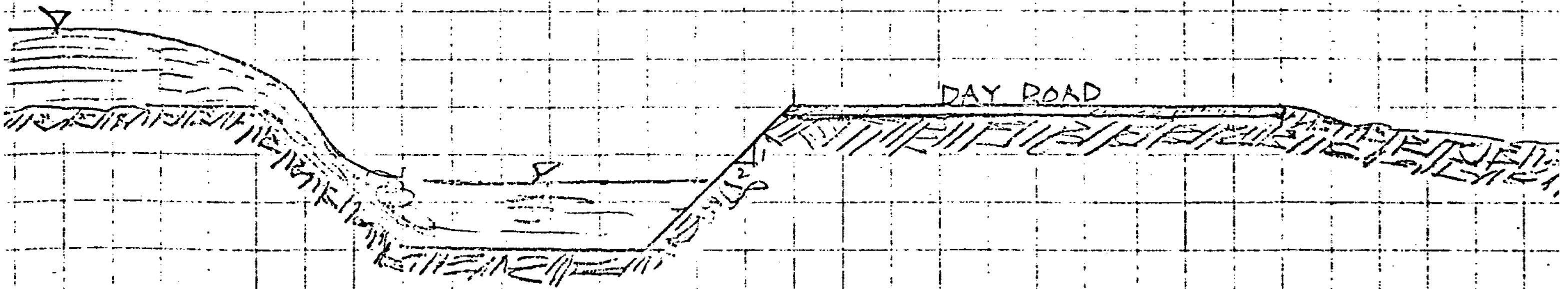
plus Contingency for misc @ 12% = 10,688
Including utility removal

Total Cost = \$ 99,760

use \$ 100,000

alternative ② SIDE CHANNEL along DAY ROAD



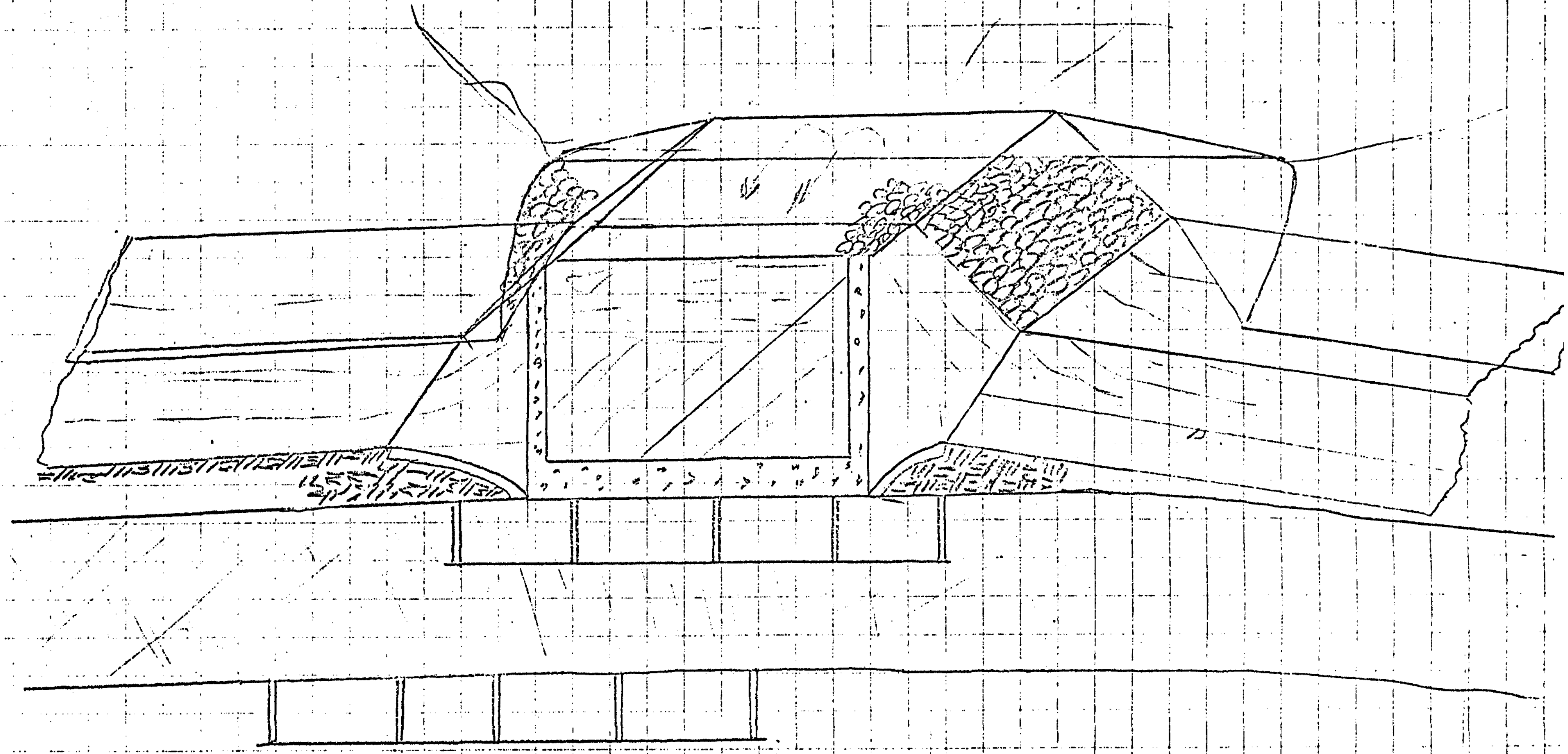


TYPICAL SIDE CHANNEL CROSS-SECTION

$Q_T = 1750$ CFS

assme $S = 0.0015$

$n = 0.035$



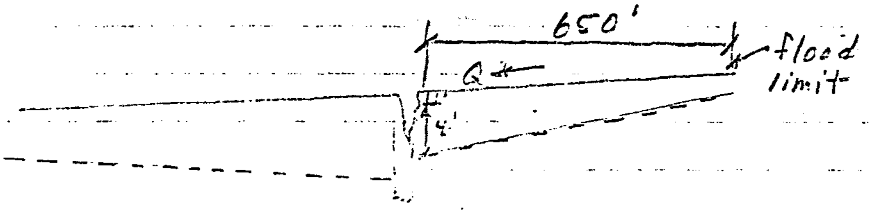
assume that 75% of total Q is between Monterey Rd. and West Branch Llagas and the remaining 25% is between flood limit and W.B.L.

$Q_T = 1750$ cfs
$Q_{75\%} = 1312$ cfs
$Q_{25\%} = 438$ cfs

for $Q_{25\%}$, the side channel will be 650 feet Long (from flood limit to W.B.L.)

assume that ½ of $Q_{25\%}$, $Q' = \frac{Q_{25\%}}{2} = 220$ c.f.s. will be captured between flood limit and ½ L or $\frac{650}{2} = 325$ ft.

Because the ground slopes toward Monterey Rd, assume little or no Q at end of limit



Thus, size channel depth at flood limit to say 1'

assume d = 4 at catch pt, bottom ELEV. 215.7'

$$S = \frac{219.5 - 215.7}{650} = 0.0058$$

at catch pt $Q_{25\%} = 438$ c.f.s., $n = 0.035$, $d_n = 4$ (f.b = 1.0')

$$K = \frac{Qn}{d_n^{8/3} S^{1/2}} = \frac{(438)(0.035)}{(4)^{8/3}(0.0058)^{1/2}} = 4.99 \qquad D_n/b = .40 \qquad b = 10 \qquad V = \frac{Q}{A} = \frac{438}{72} = 6.$$

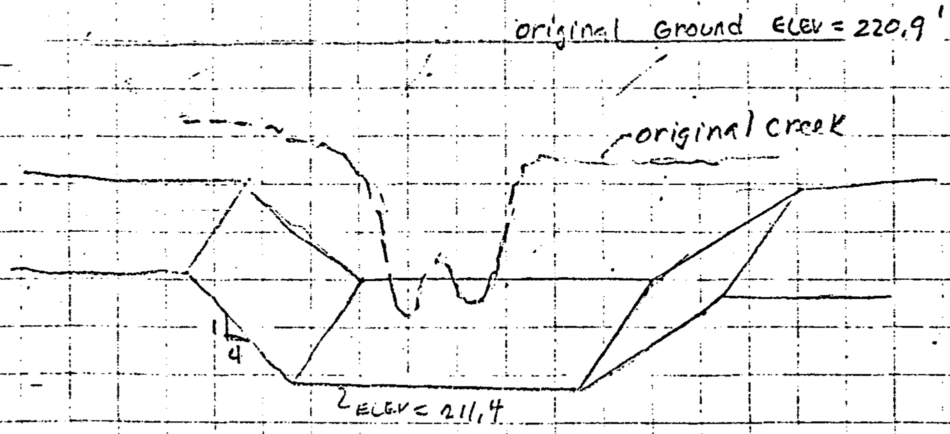
$$K = \frac{Qn}{d_n^{8/3} S^{1/2}} = \frac{(220)(0.035)}{(2)^{8/3}(0.0058)^{1/2}} = 15.92 \qquad D_n/b = 0.0957 \qquad b = 20$$

try K_c to find b $\quad K_c = \frac{Q}{D_c^{5/2}} = \frac{(220)}{2^{5/2}} = 38.89$

TA	Day Rd elev	channel bottom elev.	H	EXCAVATION AREA	Sta. LENGTH	Vol. of earthwork cy.
[illegible]	220.8	216.11	4.69	90.89		
					111.40	343.63
5191.4	220.9	216.76	4.14	75.68		
					243.4	522.0
5434.8	220.8	218.17	2.63	40.13		
					215.20	242.78
5650.0	221.0	219.42	1.58	20.79		

Vol = 1,108.4 cu. yd.

Excavation req'd for catch pt.



Earthwork $= ((9.5)(32) + (1.4)^2(4)(\frac{1}{2}) + (4.71)^2(4)(\frac{1}{2}) + (1.4)(5.6) + (4.79)(19.16,$

$- (168)(27)$

$= 284.16$ cu. yd's.

total excavation req'd of project $= 284.16 + 1,108.4 + 15,242.61$

$= 16,635.2$ cu. yds.

∴ for $Q_{75\%}$ from West Branch to Monterey Rd.

assume ½ of $Q_{75\%}$, $Q'' = 856$ c.f.s, will cover half the Length of the side channel. Size channel for lowest survey pt on Day Rd., ELEV. = 220.1

if slope of Channel say = 0.006

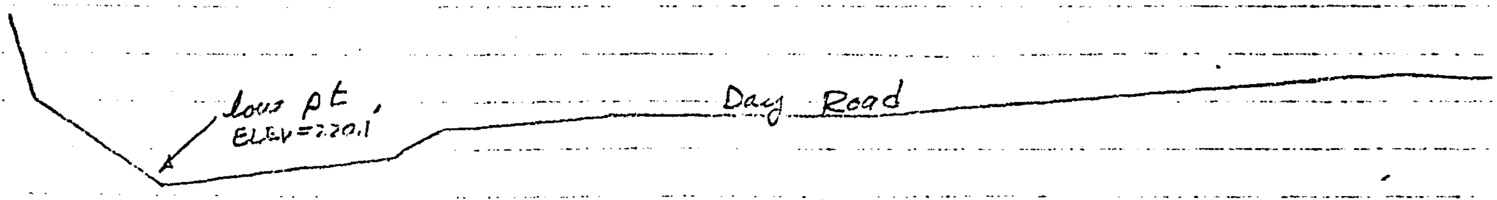
If $d_n = 3$ then $b = 99'$
If $d_n = 5$ then $b = 40'$

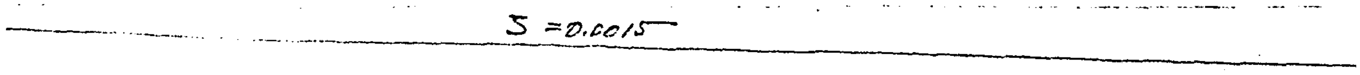
if channel slope say = 0.0015

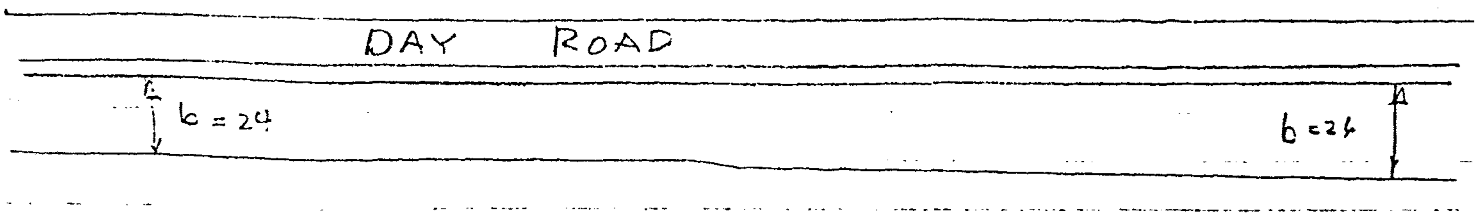
if $d_n = 3$ than $b = 62$
If $d_n = 5$ than $b = 24'$ $V = \frac{Q}{A} = \frac{856}{120} = 3.8$ f.p.s.

just before catch pt (Day Rd and West Branch Llagas), the $Q = 1312$ c.f.s.

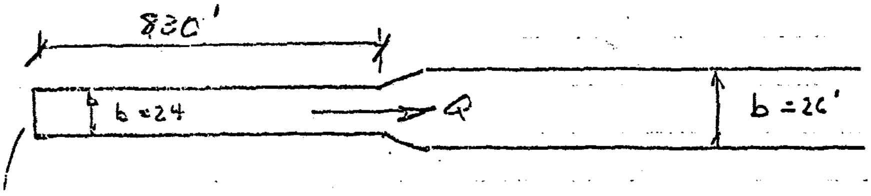
for $d_n = 7'$ $K = \frac{Qn}{d^{8/3} s^{1/2}} = 0.2731$ $b \approx 26'$ $V = \frac{Q}{A} = \frac{1312}{280} = 4.68$ f.p.

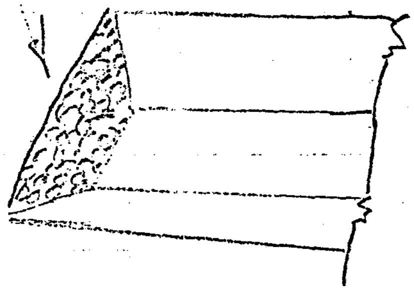


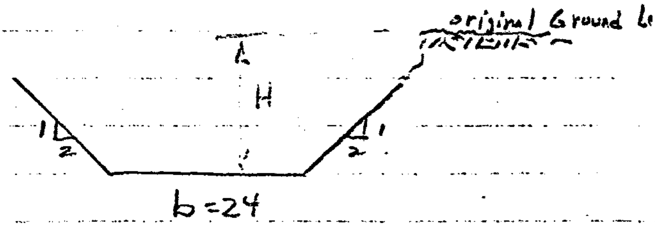




place transition (b = 24 to b = 26) at $\frac{1666}{2}$ = 830' from end of side channel near Monterey Rd.







Sta	DAY ROAD ELEV.	Channel Bottom ELEV	H	AREA (ft²) of EXCAV.	Length between Sta.	$= \frac{A_1+A_2}{2} \times \frac{L}{27}$ Volume of Earthwork
3340.0	221.1	215.29	5.81	206.95	9.3	68.95
3349.3	220.8	215.28	5.52	193.42	141.8	958.94
3491.1	220.1	215.06	5.04	171.76	238.20	1625.14
3729.3	220.3	214.71	5.59	196.66	49.80	370.48
b=24 3779.1	220.4	214.63	5.77	205.07	202.00	1652.02
b=26 3981.1	220.5	214.33	6.17	236.56	252.10	2324.5
4233.2	220.6	213.95	6.65	261.35	267.30	2693.09
4500.5	220.6	213.55	7.05	287.71	202.50	2202.83
4703.0	220.7	213.25	7.45	304.71	228.40	2661.24
4931.4	220.7	212.90	7.80	324.48	6.00	72.17
4937.4	220.7	212.89	7.81	325.05	28.60	345.53
4966.0	220.7	212.85	7.85	327.35	5.20	63.10
4971.2	220.7	212.84	7.86	327.92	7.40	89.95
78.6	220.7	212.83	7.87	328.49	9.40	114.66
2.0	220.7	212.8	7.90	330.22		
						15,242.61 cy.

estimated quantity of Rock lining

$$= \left[(32)(27) + (5.77)(26) + (19.75)(26) + (42)(39.17)\right] \frac{18}{12} \times \frac{1}{27}$$

$= 176.3$ cu. yd. (use 18" depth)

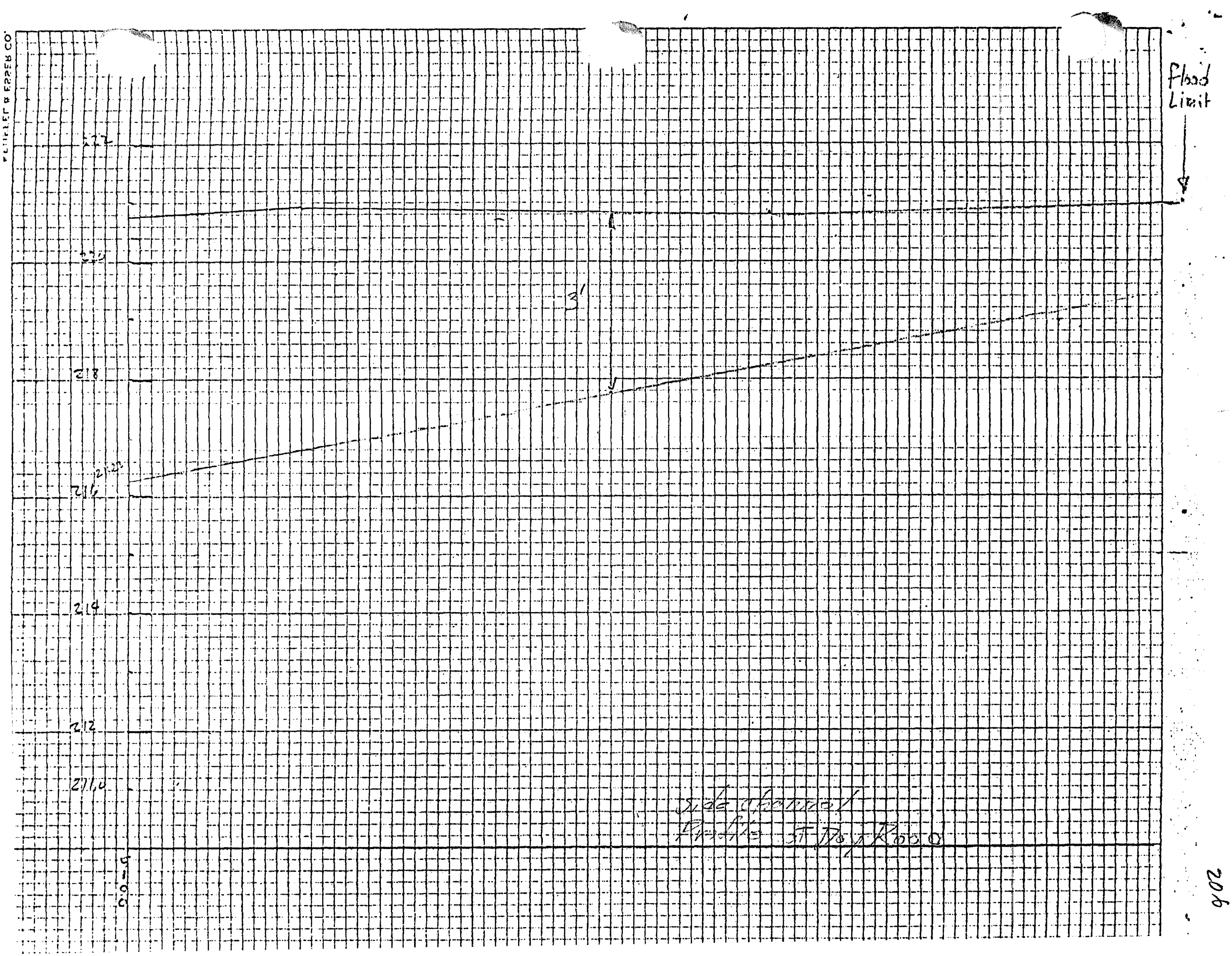
includes lining the bottom and three side slopes

Estimated
R/W Cost

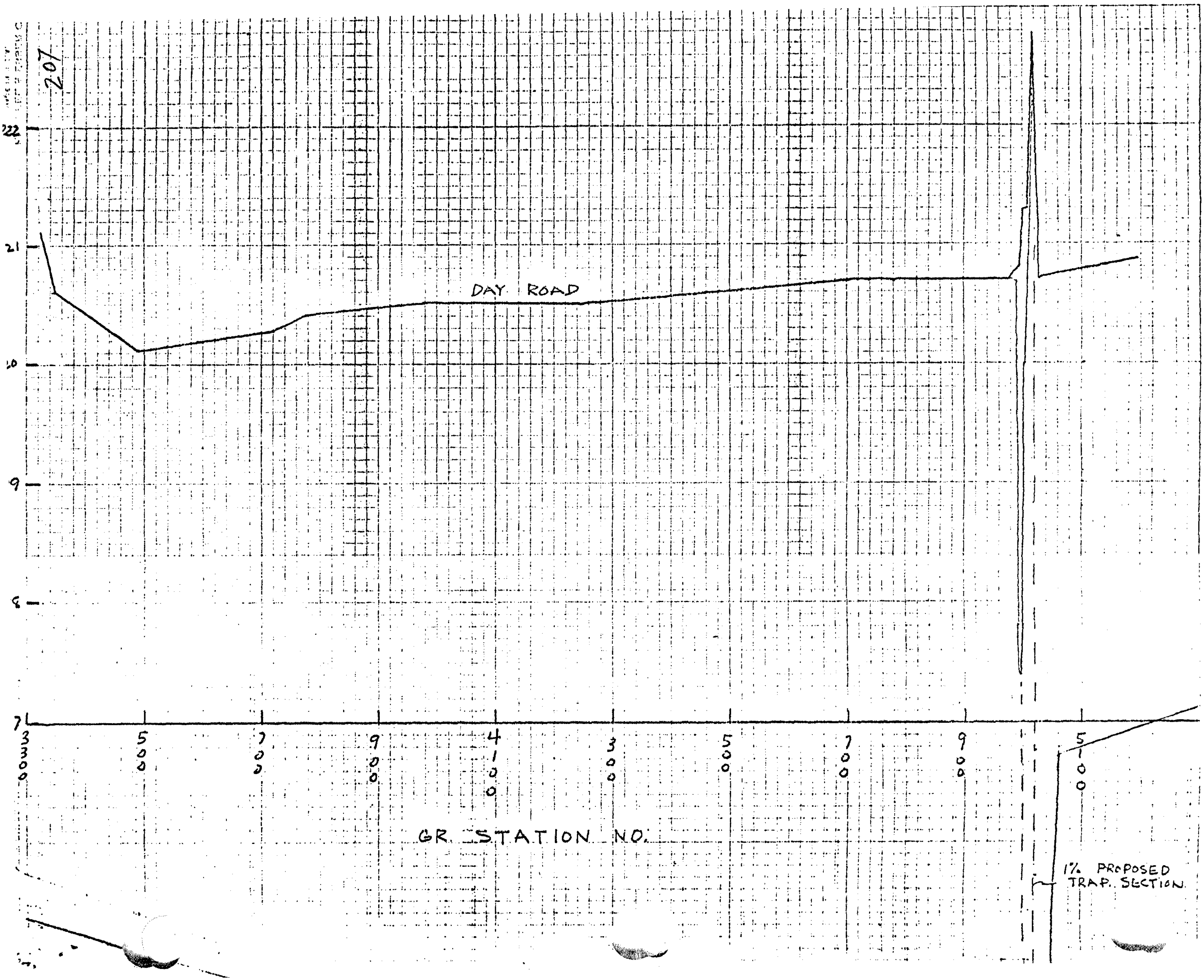
① catch area $= \left[(65)(56.76) + \frac{58.4+44.2}{2} \times 1666 + \frac{26+16.32}{2} \times 650\right]$

$= 102{,}909.2 \text{ ft}^2$

$= 2.36$ acres



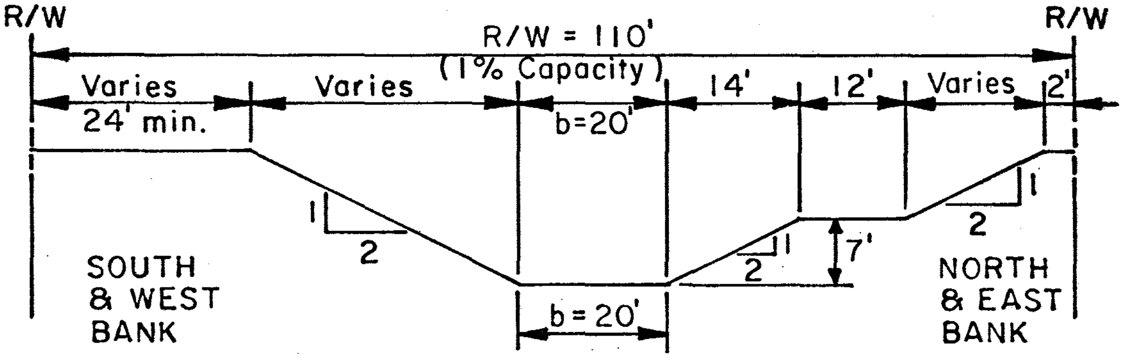
KEUFFEL & ESSER CO.


22
21
10
9
8
7
DAY ROAD
3300
500
700
900
4100
300
500
700
900
5100
GR. STATION NO.
1% PROPOSED TRAP. SECTION

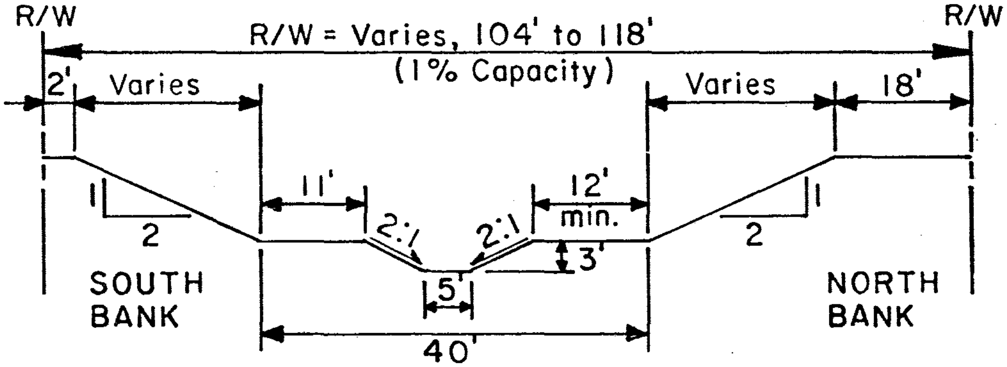
Reach 12

This reach extends from station 195+00 to 285+00 on Lions Creek. This is a trapezoidal earth channel. Two drop structures are included for grade control. Two bridges are required; one at Kern Avenue and at Morey Avenue. The maintenance road will be incorporated within the channel.

LIONS CREEK



Sta. 211+00 (Confluence w/ Morey Channel)
to
Sta. 220+00 (800' U/S Conflu. w/ North Morey)



Sta. 195+00 (100' U/S Wren Ave.)
to
Sta. 211+00 (Confluence w/ Morey Channel)

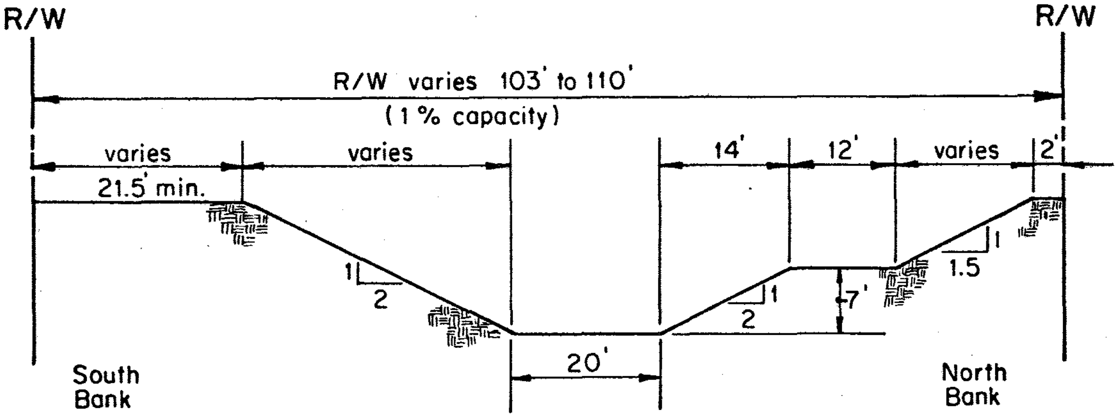
CONFLUENCE w/ WEST BRANCH LLAGAS to 3500' U/S of MOREY

REACH 12

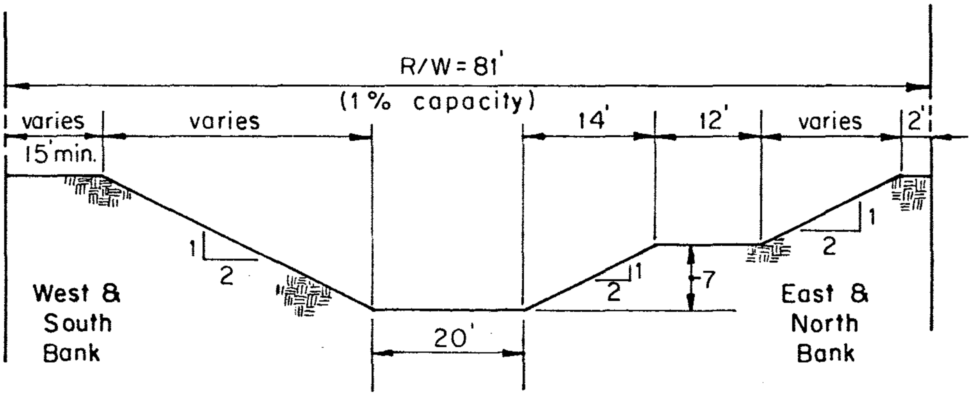
FIGURE 14

211

LIONS CREEK



STA. 250+00 (Morey Ave.) To 285+00 (3500' u/s Morey Ave.)



STA. 220+00 (800' u/s of Morey Channel) To STA. 250+00 (Morey Ave.)

CONFLUENCE WITH WEST BRANCH LLAGAS TO 3500' U/S OF MOREY AVE.

REACH 12
(Cont'd)

FIGURE 15

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 12 195+00 — 285+00 case 9

Item	Quantity	Unit Cost	$
Channel Excavation	132860	2.80	372,008
Compacted Embankment			
Drop Structures	348 ~~411 C.Y.~~	350 C.Y.	121,800 ~~143,850~~
Drainage Inlets	9 ea	4000 ea	36,000
Riprap	348 C.Y.	40 C.Y.	13920
er Stone			
ing			
Landscaping		3%	16478 ~~17,139~~
Structural Excavation			
Rectangular Concrete Channel			
Compacted Backfill			
Levee Embankment			
Site Preparation (Levees)	15.8 Ac.	350 Ac (light)	5530
Mobilization	~~62.~~ 3%		16972 ~~17653~~

Subtotal 582707 ~~606,100~~

~~15%~~ 12% Contingency 69923 ~~72,732~~

TOTAL ~~678,832~~ 652632

213

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

REACH NO. 12 195+00-285+00

Item	Quantity	Unit Cost	$
State and County Bridges	6,720 s.F	45 s.F.	302,400
Private Bridges			
RCB ~~Culverts~~ fencing	100'	6 l.f.	600
Relocation of Utilities			1,400

Subtotal 304,400

~~15%~~ 12% Contingency 36,528

TOTAL 340,928

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom			
Agricultural			
Potential Residential (low value)			
Potential Residential (medium value)	2.8	20,000	56,000
Residential/School			
Dwellings			

TOTAL 56,000

Calif
LL Hansen 7/22/81
Reach 12

Lower Llagas

Aged — As built

195+00-211+00

```
 WP PROG     1             |    WP PROG     1
     DATA                  |        DATA
      1840.          Q1    |         1050.         Q1
         7.4         D     |            4.4        D
        40.          B     |           40.         B
         2.          Z     |            2.         Z
    0.0012           S     |       0.0012          S
     0.035           N     |        0.025          N
     RUN                   |        RUN
      69.6           T     |         57.6          T
    405.52           A     |       214.72          A
5.54793931           R     | 3.598012086           R
1869.138433          Q2    | 1038.126636           Q2
4.609238589          V     | 4.834792455           V
 Q1/Q2 RATIO               |  Q1/Q2 RATIO
.9844107681                | 1.011437298
     END                   |        END
```

211+00 - 235+00

```
 WP PROG     1             |    WP PROG     1
     DATA                  |        DATA
       950.          Q1    |          500.         Q1
         5.7         D     |            3.4        D
        20.          B     |           20.         B
         2.          Z     |            2.         Z
    0.0025           S     |       0.0025          S
     0.035           N     |        0.025          N
     RUN                   |        RUN
      42.8           T     |         33.6          T
    178.98           A     |        91.12          A
3.934389477          R     | 2.588249432           R
946.9132052          Q2    | 510.5049228           Q2
5.290609036          V     | 5.602556221           V
 Q1/Q2 RATIO               |  Q1/Q2 RATIO
1.00325985                 | .9794224848
     END                   |        END
```

Calif
LL Hanson 7/22/81
Reach 12

Lower Llagas

235+00 - 245+00

```
     Aged                        As Built
 WP PROG     1                WP PROG     1
   DATA                         DATA
      950.       Q1                500.       Q1
       5.2        D                 3.1        D
       20.        B                 20.        B
        2.        Z                  2.        Z
    0.0035        S              0.0035        S
     0.035        N               0.025        N
     RUN                          RUN
      40.8        T                32.4        T
    158.08        A               81.22        A
3.654597366       R         2.398444009        R
942.0806257       Q2        511.7551215        Q2
5.959518128       V          6.30085104        V
  Q1/Q2 RATIO                 Q1/Q2 RATIO
 1.00840626                 .9770297922
     END                          END
```

245+00 - 281+00
281+00 - 285+00

```
 WP PROG     1                WP PROG     1
   DATA                         DATA
      850.       Q1                450.       Q1
       5.4        D                 3.2        D
       20.        B                 20.        B
        2.        Z                  2.        Z
    0.0025        S              0.0025        S
     0.035        N               0.025        N
     RUN                          RUN
      41.6        T                32.8        T
    166.32        A               84.48        A
3.767197167       R         2.462195976        R
 854.825521       Q2        457.8091359        Q2
5.139643584       V         5.419142233        V
  Q1/Q2 RATIO                 Q1/Q2 RATIO
.9943549639                 .9829423765
     END                          END
```

			Vol	
Drop	220 +00	- 950 cfs	174	
	268+00	850 cfs	174	
			348 cy	2000 cfs
				1000 cfs

2/9/8
21

LLAGAS CREEK — REACH 12

sta 195+00 + 211+00 b = 40'
Excavation 9.5' Average depth
20.8 C.Y./l.f X 1600 = 33280 C.Y.
1.22 X 1600 = $\boxed{1952\text{ C.Y.}}$
Sta 211+00 — 220+00 b = 20
9' depth
13.52 C.Y./l.f X 900 = $\boxed{12{,}168\text{ C.Y.}}$

Sta 220+00 — 230+00
use 8' depth

11.1 X 1000 = $\boxed{11{,}100\text{ C.Y.}}$

230+00 — 285
use 9' depth

5500 X 13.52 C.Y./l.f = $\boxed{74360\text{ C.Y.}}$

Total Channel Exc = $\boxed{132{,}860\text{ C.Y.}}$

2 Bridges Kern & Murey Ave
90' X 40 = 3600 Kern
74 X 40 = 2960 Murey } use 6,720

R/w width
sta 195+00 — 211+00 R/w = 104
500 l.f X 104' X $\frac{1}{43{,}560}$ = 1.2 Ac
21' X 280' X $\frac{1}{43{,}560}$ = .14 Ac
71' X 900' X $\frac{1}{43{,}560}$ = 1.5 Ac
$\boxed{2.8\text{ Ac}}$

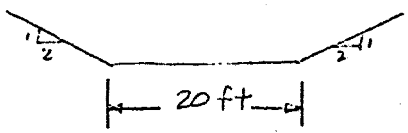
Total R/w to be Acq $\boxed{3.7\text{ ac}}$

Site Clearing
104' X 1600 X $\frac{1}{43{,}560}$ = 3.8 Ac
71' X 7400 X $\frac{1}{43{,}560}$ = 12.0
15.8 Ac

Lions creek
Reach 12

at sta 220+00, find control depth

$Q = 950$ cfs, $n = 0.035$, $S = 0.0025$



$$K_c' = \frac{Q}{b^{5/2}} = \frac{950}{20^{5/2}} = 0.5311$$

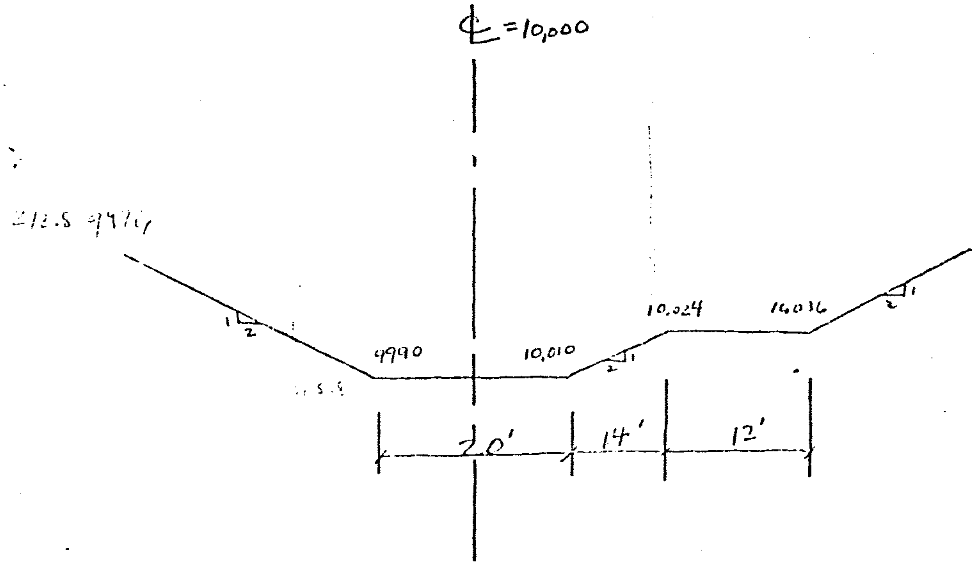
$$\frac{.19 - .18}{.574 - .524} = \frac{.19 - x}{.574 - .5311}$$

$$x = \frac{D_c}{b} = 0.1814$$

$d_c = 3.63$ feet

critical elevation = 207.93 feet

tail water elevation = 210.24 feet ⇐ Control



Sta 220+00 to Sta 250+00

$Q = 950$ c.f.s
$n = 0.035$
$S = 0.0025$

$$K = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(950)(0.035)}{(20)^{8/3}(0.0025)^{1/2}} = 0.2256$$

$$\frac{.29 - .28}{.232 - .217} = \frac{.29 - x}{.232 - 0.2256}$$

$$x = \frac{d_n}{b} = 0.2557 \qquad d_n = 5.71 \text{ feet}$$

Reach 12 Lions Creek

$Q_{1\%} = 1840$ cfs sta 195+00 → 211+00
$Q_{1\%} = 950$ cfs sta 211+00 → 245+00
$Q_{1\%} = 950$ cfs sta 245+00 → 285+00

sta 195+00 – 211+00
use b = 20 ~~See p. [illegible] for hydraulic calc.~~

sta 211+00 – 245+00
$Q_{1\%} = 950$ cfs.
S = .0025
n = .035
Try b = 20

$$K' = \frac{Qn}{b^{8/3}S^{1/2}} = \frac{(950)(.035)}{(2947)(.05)} = 0.23$$

$$\frac{D}{b} = 0.19 \qquad D = 3.8'$$

$$V = \frac{Q}{A} = \frac{950}{182} = 5.2\ fps$$

$$R = \frac{A}{P} = \frac{182}{45} = 4$$

$$F.B. = \left[\frac{V^2}{2g} + [illegible]\right] 0.[illegible] = 1.24'$$

for S = .0[illegible]

$$K' = \frac{Qn}{(2947)(.0[illegible])} = 0.19$$

$$\frac{D}{b} = 0.16 \qquad D = 3.2'$$

$$V = \frac{Q}{A} = \frac{950}{153} = 6\ fps$$

$$R = \frac{A}{P} = \frac{153}{43.3} = 3.7$$

$$F.B. = \left[\frac{V^2}{2g} + [illegible]\right] 0.2 = 1.3$$

min channel depth = 6.5 [illegible]

[illegible] 4.5 [illegible]

LLAGAS CREEK - West Branch

J22

Reach [illegible]

$Q_{15} = 850$ cfs Sta 245 → 225

$S = .0025$

$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(850)(.035)}{([illegible])(.05)} = 0.20$

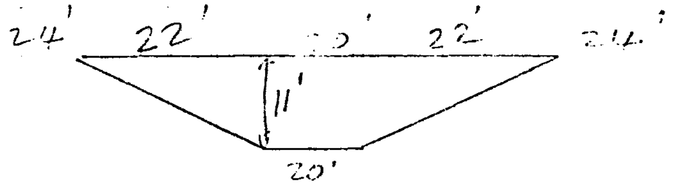
$\frac{D_n}{b} = 0.26 \quad D_n = 5.2$

$V = \frac{Q}{A} = \frac{850}{153} = [illegible]$

$R = \frac{A}{P} = \frac{153}{43.[illegible]} = 3.7$

R/W Req

195+00 → 211+00 use 146'
211+00 → 245+00 ? use 110'
245+00 — 225+00
Max channel depth 11'



R/W = 24 + 22 + 20 + 22 + 24' = 112

Use 110' O.K.

Area to be Acq.

36' × 1350 × 1/43560 = 1.12 Ac

146 × 480 × 1/43560 = 1.61 Ac

36 × 340 × 1/43560 = 0.28 Ac.

60 × 280 × 1/43560 = 0.39 Ac

110 × (900+1[illegible]) × 1/43560 = 2.87 Ac

24.[illegible] × 1600 × 1/43560 = [illegible]

```
 19250.000   1840,00   207,42   20[illegible]      4,43   34,00      0,00   207,[illegible]   35,00   199,87     7,55   9960,53 [illegible],47
 19500.000   1840,00   207,69   20[illegible]      4,46   250,00     0,00   208,0[illegible]  35,00   200,19     7,50   9961,18 100  ,82
 19750.000   1840,00   208,07   209,90    3,06   250,00     0,00   208,22    35,00   200,49     7,58   9961,18 100  ,82
 20000.000   1840,00   208,14   209,98    4,58   250,00     0,00   208,46    35,00   200,79     7,35   9961,62 100  ,38
 20250.000   1840,00   208,44   210,00    4,58   250,00     0,00   208,76    35,00   201,09     7,35   9962,18 100 7,82
 20584.000   1840,00   208,57   210,00    4,80   334,00     0,00   208,93    15,00   201,49     7,08   9962,98 100 7,02
 20616.000   1840,00   208,58   210,00    4,82    32,00     0,00   208,94    35,00   201,53     7,05   9963,06 1003 ,94
 21000.000   1840,00   209,11   210,00    4,77   384,00     0,00   209,46    35,00   201,99     7,12   9963,98 1003 ,02
 21100.000    950,00   209,48   210,00    2,36   100,00     0,00   209,56    35,00   202,11     7,37   9964,22 1003 ,78
 21124.000    950,00   209,46   210,00    2,63    24,00     0,00   209,57    15,00   202,14     7,32   9964,28 1003 ,72
 21147.000    950,00   209,44   210,00    2,98    23,00     0,00   209,58    35,00   202,17     7,27   9964,33 1003 ,67
 21200.000    950,00   209,47   210,13    3,05    53,00     0,00   209,62    35,00   202,30     7,17   9964,33 1003 ,67
 21300.000    950,00   209,54   210,38    3,17   100,00     0,00   209,69    35,00   202,55     6,98   9964,33 10035,67
 21400.000    950,00   209,61   210,63    3,30   100,00     0,00   209,78    35,00   202,80     6,80   9964,33 100  ,67
 21500.000    950,00   209,69   210,88    3,43   100,00     0,00   209,87    35,00   203,05     6,63   9964,33 10035,67



   SECNO        Q        CWSEL    XLBEL      VCH     XLCH      CRIWS      EG     K*XNCH    ELMIN     DEPTH     STCHL    STCHR
 21600.000    950,00   209,78   211,13    3,56   100,00     0,00   209,97    35,00   203,30     6,47   9964,33 10035,67
 21700.000    950,00   209,87   211,38    3,69   100,00     0,00   210,09    35,00   203,55     6,32   9964,33 10035,67
 21800.000    950,00   209,98   211,63    3,82   100,00     0,00   210,21    35,00   203,80     6,18   9964,33 10035,67
 21900.000    950,00   210,11   211,88    3,94   100,00     0,00   210,35    35,00   204,05     6,05   9964,33 1003 ,67
 22000.000    950,00   210,24   212,13    4,06   100,00     0,00   210,49    35,00   204,30     5,94   9964,33 100  ,67
```

B.

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                                                                THIS RUN EXECUTED  4/17/81  10:48
**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED JULY1979
  ERROR CORR -  01,02,03
  MODIFICATION -  50,51,52
**************************************************

IOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

ACH 12 LIONS CREEK

UMMARY PRINTOUT

     SECNO        Q       CWSEL     XLBEL      VCH      XLCH     CRIWS      EG     K*XNCH    ELMIN     DEPTH    STCHL    STCHR

  22000.000   950.00    210.24    212.80     7.41      0.00      0.00    211.09    35.00    205.80     4.44   9976.00 1002 .00
  22100.000   950.00    210.99    213.05     6.43    100.00      0.00    211.63    35.00    206.05     4.94   9976.00 1002 .00
  22200.000   950.00    211.47    213.30     6.06    100.00      0.00    212.04    35.00    206.30     5.17   9976.00 1002 .00
  22300.000   950.00    211.86    213.55     5.84    100.00      0.00    212.39    35.00    206.55     5.31   9976.00 1002 .00
  22400.000   950.00    212.20    213.80     5.71    100.00      0.00    212.71    35.00    206.80     5.40   9976.00 1002 .00
  22500.000   950.00    212.52    214.05     5.61    100.00      0.00    213.01    35.00    207.05     5.47   9976.00 1002 .00
  22600.000   950.00    212.82    214.30     5.54    100.00      0.00    213.30    35.00    207.30     5.52   9976.00 1002 .00
  22700.000   950.00    213.11    214.55     5.49    100.00      0.00    213.58    35.00    207.55     5.56   9976.00 1002 .00
  22800.000   950.00    213.39    214.80     5.45    100.00      0.00    213.85    35.00    207.80     5.59   9976.00 1002 .00
  22900.000   950.00    213.67    215.05     5.41    100.00      0.00    214.12    35.00    208.05     5.62   9976.00 1002 .00
  23000.000   950.00    213.94    215.30     5.39    100.00      0.00    214.39    35.00    208.30     5.64   9976.00 1002 .00
  23100.000   950.00    214.20    215.55     5.37    100.00      0.00    214.65    35.00    208.55     5.65   9976.00 1002 .00
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final

STA 220+00 To Sta 268+00

ALTERNATIVE F

22.

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                                                                                                  5,56   9976,00 100 4,00
 22800,000    950,00    213,39   2               5,45   100,00       0,00   213,          35,00      7,80        5,59   9976,00       ,00
 22900,000    950,00    213,67   215,05          5,41   100,00       0,00   214,12        35,00    208,05        5,62   9976,00 100 4,00
 23000,000    950,00    213,94   215,30          5,39   100,00       0,00   214,39        35,00    208,30        5,64   9976,00 100 4,00
 23100,000    950,00    214,20   215,55          5,37   100,00       0,00   214,65        35,00    208,55        5,65   9976,00 100 4,00
 23200,000    950,00    214,46   215,80          5,36   100,00       0,00   214,91        35,00    208,80        5,66   9976,00 100 4,00
 23300,000    950,00    214,72   216,05          5,34   100,00       0,00   215,17        35,00    209,05        5,67   9976,00 100 4,00
 23400,000    950,00    214,98   216,30          5,33   100,00       0,00   215,42        35,00    209,30        5,68   9976,00 100 4,00
 23500,000    950,00    215,24   216,55          5,33   100,00       0,00   215,68        35,00    209,55        5,69   9976,00 10024,00
 23600,000    950,00    215,48   216,90          5,45   100,00       0,00   215,94        35,00    209,90        5,58   9976,00 10024,00
 23700,000    950,00    215,74   217,25          5,58   100,00       0,00   216,23        35,00    210,25        5,49   9976,00 100 4,00
 23800,000    950,00    216,03   217,60          5,68   100,00       0,00   216,53        35,00    210,60        5,43   9976,00 100 4,00
 23900,000    950,00    216,32   217,95          5,75   100,00       0,00   216,84        35,00    210,95        5,37   9976,00 100 4,00


     SECNO         Q     CWSEL    XLBEL         VCH     XLCH        CRIWS     EG        K*XNCH     ELMIN        DEPTH     STCHL     STCHR
 24000,000    950,00    216,64   218,30          5,81   100,00       0,00   217,16        35,00    211,30        5,34   9976,00 10024,00
 24100,000    950,00    216,96   218,65          5,85   100,00       0,00   217,49        35,00    211,65        5,31   9976,00 10024,00
 24200,000    950,00    217,28   219,00          5,88   100,00       0,00   217,82        35,00    212,00        5,28   9976,00 10024,00
 24300,000    950,00    217,62   219,35          5,91   100,00       0,00   218,16        35,00    212,35        5,27   9976,00 10024,00
 24400,000    950,00    217,96   219,70          5,93   100,00       0,00   218,50        35,00    212,70        5,26   9976,00 10024,00
 24500,000    850,00    218,39   220,05          5,18   100,00       0,00   218,81        35,00    213,05        5,34   9976,00 10024,00
 24600,000    850,00    218,65   220,30          5,17   100,00       0,00   219,07        35,00    213,30        5,35   9976,00 10024,00
 24700,000    850,00    218,91   220,55          5,16   100,00       0,00   219,32        35,00    213,55        5,36   9976,00 10  4,00
 24200,000   950,00  217,28  21          5,88  100,00    0,00  217,82   35,00  212,00    5,28  9976,00 10   ,00
 24300,000   950,00  217,62  21          5,91  100,00    0,00  218,1    35,00  212,35    5,27  9976,00      ,00
 24400,000   950,00  217,96  219,70      5,93  100,00    0,00  218,50   35,00  212,70    5,26  9976,00 100  ,00
 24500,000   850,00  218,39  220,05      5,18  100,00    0,00  218,81   35,00  213,05    5,34  9976,00 100 4,00
 24600,000   850,00  218,65  220,30      5,17  100,00    0,00  219,07   35,00  213,30    5,35  9976,00 100 4,00
 24700,000   850,00  218,91  220,55      5,16  100,00    0,00  219,32   35,00  213,55    5,36  9976,00 100 4,00
 24800,000   850,00  219,16  220,80      5,16  100,00    0,00  219,58   35,00  213,80    5,36  9976,00 100 4,00
 24900,000   850,00  219,42  221,05      5,15  100,00    0,00  219,83   35,00  214,05    5,37  9976,00 100 4,00
 24984,000   850,00  219,47  221,26      5,36   84,00    0,00  219,92   15,00  214,26    5,21  9976,00 100 4,00
 25016,000   850,00  219,48  221,34      5,47   32,00    0,00  219,94   15,00  214,34    5,14  9976,00 100 4,00
 25100,000   850,00  219,54  221,55      5,70   84,00    0,00  220,04   35,00  214,55    4,99  9976,00 100 4,00
 25200,000   850,00  219,89  221,80      5,54  100,00    0,00  220,37   35,00  214,80    5,09  9976,00 100 4,00
 25300,000   850,00  220,21  222,05      5,43  100,00    0,00  220,67   35,00  215,05    5,16  9976,00 100 4,00
 25400,000   850,00  220,51  222,30      5,36  100,00    0,00  220,96   35,00  215,30    5,21  9976,00 100 4,00
 25500,000   850,00  220,80  222,55      5,31  100,00    0,00  221,24   35,00  215,55    5,25  9976,00 100 4,00
 25600,000   850,00  221,08  222,80      5,27  100,00    0,00  221,51   35,00  215,80    5,28  9976,00 100 4,00
 25700,000   850,00  221,35  223,05      5,24  100,00    0,00  221,78   35,00  216,05    5,30  9976,00 100 4,00
 25800,000   850,00  221,62  223,30      5,22  100,00    0,00  222,04   35,00  216,30    5,32  9976,00 100 4,00
 25900,000   850,00  221,88  223,55      5,20  100,00    0,00  222,30   35,00  216,55    5,33  9976,00 100 4,00
 26000,000   850,00  222,14  223,80      5,18  100,00    0,00  222,56   35,00  216,80    5,34  9976,00 100 4,00
 26100,000   850,00  222,40  224,05      5,17  100,00    0,00  222,82   35,00  217,05    5,35  9976,00 100 4,00
 26200,000   850,00  222,66  224,30      5,16  100,00    0,00  223,07   35,00  217,30    5,36  9976,00 100 4,00
 26300,000   850,00  222,91  224,55      5,16  100,00    0,00  223,33   35,00  217,55    5,36  9976,00 100 4,00
 26400,000   850,00  223,17  224,80      5,15  100,00    0,00  223,58   35,00  217,80    5,37  9976,00 100 4,00
 26500,000   850,00  223,43  225,05      5,15  100,00    0,00  223,83   35,00  218,05    5,37  9976,00 100 4,00
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  2590    00    850,00   221,88   22              5        100,00        0,00   222,            35,00   216,55        5,33   9976,00        ,00
  26000,000     850,00   222,14   223,80          5,18     100,00        0,00   222,56          35,00   216,80        5,34   9976,00 100 4,00
  26100,000     850,00   222,40   224,05          5,17     100,00        0,00   222,82          35,00   217,05        5,35   9976,00 100 4,00
  26200,000     850,00   222,66   224,30          5,16     100,00        0,00   223,07          35,00   217,30        5,36   9976,00 100 4,00
  26300,000     850,00   222,91   224,55          5,16     100,00        0,00   223,33          35,00   217,55        5,36   9976,00 100 4,00
  26400,000     850,00   223,17   224,80          5,15     100,00        0,00   223,58          35,00   217,80        5,37   9976,00 100 4,00
  26500,000     850,00   223,42   225,05          5,15     100,00        0,00   223,83          35,00   218,05        5,37   9976,00 100 4,00
  26600,000     850,00   223,67   225,30          5,14     100,00        0,00   224,08          35,00   218,30        5,37   9976,00 100 4,00
  26700,000     850,00   223,93   225,55          5,14     100,00        0,00   224,34          35,00   218,55        5,38   9976,00 100 4,00


     SECNO         Q     CWSEL    XLBEL           VCH      XLCH         CRIWS    EQ            K*XNCH    ELMIN        DEPTH     STCHL          TCHR
  26800,000     850,00   224,18   225,80          5,14     100,00        0,00   224,59          35,00   218,80        5,38   9976,00 100 4,00

SUMMARY OF ERRORS
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NOTE= ASTERISK (*) AT LEFT OF CROSS-     ON NUMBER INDICATES MESSAGE IN SUMMARY     ERRORS LIST

REACH 12
SUMMARY PRINTOUT
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Lions Creek Sta 268+00 to Sta 285+00
ALTERNATIVE F

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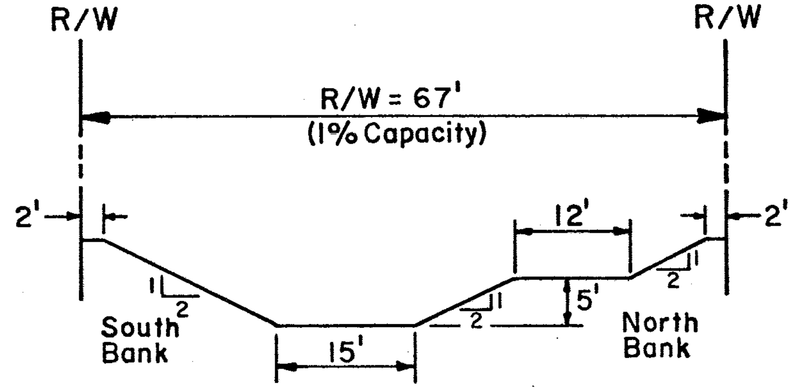
      SECNO         Q       CWSEL     XLBEL      VCH      XLCH      CRIWS        EG    K*XNCH     ELMIN     DEPTH      STCHL      STCH
  26800.000    850,00      227,43    230,80     8,59      0,00       0,00    228,58     35,00    223,80      3,63    9976,00  10024,0
  26900.000    850,00      228,67    231,05     6,29    100,00       0,00    229,28     35,00    224,05      4,62    9976,00  10024,0
  27000.000    850,00      229,16    231,30     5,89    100,00       0,00    229,69     35,00    224,30      4,86    9976,00  10024,0
  27100.000    850,00      229,55    231,55     5,66    100,00       0,00    230,05     35,00    224,55      5,00    9976,00  10024,0
  27200.000    850,00      229,89    231,80     5,52    100,00       0,00    230,37     35,00    224,80      5,09    9976,00  10024,0
  27300.000    850,00      230,21    232,05     5,43    100,00       0,00    230,67     35,00    225,05      5,16    9976,00  10024,0
  27400.000    850,00      230,51    232,30     5,36    100,00       0,00    230,96     35,00    225,30      5,21    9976,00  10024,0
  27500.000    850,00      230,80    232,55     5,31    100,00       0,00    231,24     35,00    225,55      5,25    9976,00  10024,0
  27600.000    850,00      231,08    232,80     5,27    100,00       0,00    231,51     35,00    225,80      5,28    9976,00  10024,0
  27700.000    850,00      231,35    233,05     5,24    100,00       0,00    231,78     35,00    226,05      5,30    9976,00  10024,0
  27800.000    850,00      231,62    233,30     5,22    100,00       0,00    232,04     35,00    226,30      5,32    9976,00  10024,0
  27900.000    850,00      231,88    233,55     5,20    100,00       0,00    232,30     35,00    226,55      5,33    9976,00  10024,0
  28000.000    850,00      232,14    233,80     5,18    100,00       0,00    232,56     35,00    226,80      5,34    9976,00  10024,0
  28100.000    850,00      232,40    234,05     5,17    100,00       0,00    232,82     35,00    227,05      5,35    9976,00  10024,0
  28200.000    850,00      232,66    234,30     5,16    100,00       0,00    233,07     35,00    227,30      5,36    9976,00  10024,0
  28300.000    850,00      232,91    234,55     5,16    100,00       0,00    233,33     35,00    227,55      5,36    9976,00  10024,0
  28400.000    850,00      233,17    234,80     5,15    100,00       0,00    233,58     35,00    227,80      5,37    9976,00  10024,0
  28500.000    850,00      233,42    235,05     5,15    100,00       0,00    233,83     35,00    228,05      5,37    9976,00  10024,0
```

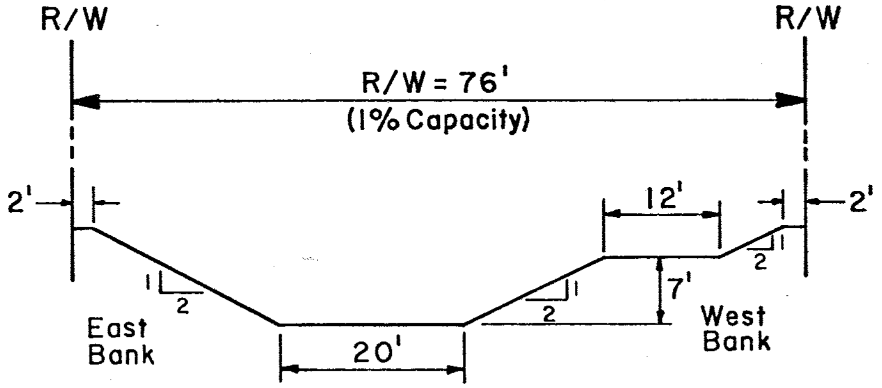
Reach 13

This reach consists of two segments. One segment extends west from station 217+00 on Lions Creek to station 233. The other segment extends east from Station 211+00 on Lions Creek to Station 245+00. Due to right of way problems the maintenance road is located on a berm within the channel section. No drop structures are required in these trapezoidal earth channels. Two bridges are required, both on Morey Avenue.

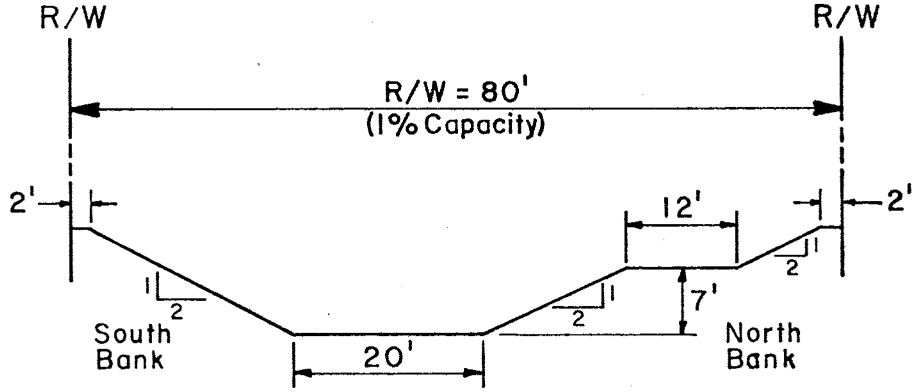
MOREY CHANNEL & NORTH MOREY CHANNEL



MOREY CHANNEL STA.230+00(1900' U/S Lions Cr.) To STA. 245+00 (Morey Ave.)



MOREY CHANNEL STA.211+00 (Confl. w/Lions Cr.) To STA.230+00(1900' U/S Lions Cr.)



NORTH MOREY CHANNEL STA.217+00(Confl. w/Lions Cr.) To STA. 233+00 (Morey Ave.)

CONFLUENCE WITH LIONS CREEK TO MOREY AVENUE

REACH 13

FIGURE 16

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 13S sta 211+00 - 245+00 case 9
13N sta 217+00 - 233+00

Item	Quantity	Unit Cost	
Channel Excavation	~~55990~~ 56063 ~~54100~~ C.Y.	2.80 ~~3.40~~ C.Y.	156,976 ~~156,772~~ ~~183,440~~
Drainage inlets	6 ea	4000 ~~6000~~ C.Y.	24,000 ~~36,000~~
Seeding	~~5.26~~	~~2000 Ac~~	~~10,520~~
Landscaping		3% L.S	~~7386~~ 5712 ~~6,114~~
Site Clearing	8.2 ~~6.6~~	1,150	9430 ~~7590~~
Mobilization		3% L.S	~~7607~~ 588 ~~11,[illegible]~~

Subtotal	202,002 ~~261,185~~ ~~259,662~~
12% Contingency	2424 ~~31,342~~ ~~25,166~~
Total $	~~292,527~~ ~~285,628~~ 226 242

Calif Lower Llagas
L L Hansen 8/5/81
Reach 13 211+00 — 245+00

Excavation	17788 @ 2.80	49806
Drainage Inlets	4 @ 4000	16000
Landscape (.03)	1.66 ~~2.4~~/6.6	1436
Site Clearing	2.6/8.2	2990
		70232
Mobilization (.03)		2106
Subtotal		72338
Contengency (0.12)		8681
Total		81019
Engr (.15)		12153
Adm (.05)		4051
Total 566		97223
State+County Bridges	5080 @ 45	= 228600
Barbed Wire	200 @ 6	= 1200
Utilities	15000	= 15000
Subtotal		244800
Contengency (.12)		29376
Sub Total		274176
Engr (.20)		54835
Sub Total		329,011
R/W		
Creek Bottom	1.03 @ 200	206
Potential Res.	2.4 @ 20000	48000
Subtotal		48206
Total Other		474,440

Calif Lower Llagas

LLHansen 8/5/81

Reach 13 217+00 – 233+00

Excavation	38275	@2.80	= 107170
Drainage Inlets	2 @ 4000		8000
Landscape (.03)	4.94/6.6		4275
Site Clearing	5.6/8.2		6440
			125885
Mobilization (.03)			3777
Subtotal			129,662
Contengency (0.12)			15559
Total			145,221
Engr (.15)			21783
Adm (05)			7261
Total 566			174265
State & County Bridges	—		—
Barbed Wire		—	
Utilities		10 500	
Subtotal		10 500	
Contengency (.12)		1260	
Total		11760	
Engr (.20)		2352	
Total		14112	
R/W			
Creek Bottom	—		
Potential Res.	—		
Subt.			
Total Other		14112	
Total Reach		188377	

LLAGAS CREEK - SUPPLEMENTAL MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 13S sta 211+00 – 245+00
13N sta 217+00 – 233+00

Item	Quantity	Unit Cost	$
State and County Bridges	5080 S.F	45.00	228600
Private Bridges	1		
Barbed Wire Fence	200 ~~10,000~~	6 L.F	1200 ~~60000~~
Relocation of Utilities			25500

Subtotal 255,300 ~~314,100~~

12 ~~15~~% Contingency 30,636 ~~47,115~~

TOTAL 285,936 ~~361,215~~

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.03	200	206
Agricultural			
Potential Residential (low value)			
Potential Residential (medium value)	~~5.7~~ 2.4	20,000	48000 ~~114,000~~
Residential/School			
Landscaping Addition			

TOTAL 48206 ~~114,206~~

Calif
LL Hansen 7/23/81
Reach 13

Lower Hagas

211—227
227-230

Aged

```
WP PROG      1
  DATA
      420.      Q1
        4.      D
       20.      B
        2.      Z
   0.0018       S
    0.035       N
   RUN
      36.       T
     112.       A
2.956038652     R
415.5389894     Q2
3.710169548     V
 Q1/Q2 RATIO
1.01073548
     END
```

As Built

```
WP PROG      1
  DATA
      260.      Q1
      2.55      D
       20.      B
        2.      Z
   0.0018       S
    0.025       N
   RUN
      30.2      T
    64.005      A
2.038119624     R
259.4669632     Q2
4.053854593     V
 Q1/Q2 RATIO
1.002054353
     END
```

230+00 245+00

```
WP PROG      1
  DATA
      200.      Q1
       2.2      D
       15.      B
        2.      Z
    0.006       S
    0.035       N
   RUN
      23.8      T
     42.68      A
1.718286446     R
201.3636975     Q2
4.717987289     V
 Q1/Q2 RATIO
.9932276895
     END
```

```
WP PROG      1
  DATA
      120.      Q1
      1.35      D
       15.      B
        2.      Z
    0.006       S
    0.025       N
   RUN
      20.4      T
    23.895      A
1.135835165     R
119.7673207     Q2
5.012233552     V
 Q1/Q2 RATIO
1.001942761
     END
```

217+00 - 233+00

```
WP PROG      1
  DATA
      485.      Q1
       3.1      D
       20.      B
        2.      Z
    0.006       S
    0.035       N
   RUN
      32.4      T
     81.22      A
2.398444009     R
 478.603384     Q2
5.892678946     V
 Q1/Q2 RATIO
1.013365171
     END
```

```
WP PROG      1
  DATA
      300.      Q1
      1.95      D
       20.      B
        2.      Z
    0.006       S
    0.025       N
   RUN
      27.8      T
    46.605      A
 1.62269919     R
296.3095287     Q2
6.357891401     V
 Q1/Q2 RATIO
1.012454784
     END
```

LLAGAS CREEK — West Branch

10/15/8

Y 23

Reach no 13. Morey Channel

$Q_{1\%} = 420$ cfs   old $Q = 450$ cfs   Sta 211+00 – 230

$Q_{1\%} = 200$ cfs   Old $Q = 220$ cfs   Sta 230+00 – 245

For $Q_{1\%} = 420$ cfs $b = 20$

$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(420)(.035)}{(2947)(.0018)^{1/2}} = \frac{(420)(.035)}{(2947)(.042)}$$

$$= 0.119$$

$$\frac{D_n}{b} = 0.20 \qquad D_n = 4'$$

$$V = \frac{Q}{A} = \frac{420}{112} = 3.75 \text{ fps}$$

$$R = \frac{A}{P} = \frac{112}{37.9} = 3$$

$S = .006$ $b = 15'$

$$K' = \frac{(200)(.035)}{(1368)(.078)} = .10$$

$$\frac{D_n}{b} = .145 \qquad D_n = 2.2$$

$$V = \frac{Q}{A} = \frac{200}{42.7} = 4.7 \text{ fps}$$

$$R = \frac{A}{P} = \frac{42.5}{24.8} = 1.7$$

R/W Req.   channel depth 9'   R/W = 18+18+20+20

$\boxed{\text{Use } 105'}$ for $b = 20'$ $= 104$

use 90' Maint Rd on one side only

For $b = 15'$ $\boxed{\text{Use } \cancel{95}}$ use 80

void

Area to be Acq

211+00 – 230+00

$$?\left\{\left[\cancel{20}^{25} \times 730\right] + (950) \times (\cancel{70}^{55})\right\} \times \frac{1}{43560} = \boxed{\overset{1.28}{\cancel{1.86}} \text{ A.C}}$$

V

230+00 – 245+00

$$\overset{80}{\cancel{95}} \times 1500 \times \frac{1}{43560} = \boxed{\overset{2.76}{\cancel{3.27}} \text{ A.C}}$$

Sht 13 of

LLAGAS CREEK — West Branch

10/15/85

Y 237

Reach 13 (Cont.)

Morey C. Between Station 211+00 — 230+00 Morey ch

Excavation

$$Exc = \frac{(56+20)(9)}{2} \times 1 \times \frac{1}{27} \times 1900$$

$0.85\ C.Y/l.f \times 1900 = \boxed{1615\ C.Y}$ ✓

$= 24067$ use $\boxed{25{,}000\ C.Y.}$

Morey C. Sta 230+00 — 245+00

$$Exc = \frac{(23+75)7}{2} \times 1 \times \frac{1}{27} \times 1{,}500$$

$= 11278\ C.Y$ use $\boxed{12{,}000\ C.Y}$

$0.85\ C.Y/lf \times 1500 = \boxed{1275\ C.Y.}$

North Morey channel sta 217+00 — 233+00

$Q_{1\%} = 485$ old $Q_{1\%} = 280$

use $b = 20'$ $s = .006$

$$K' = \frac{Qn}{b^{8/3} S^{1/2}} = \frac{(485)(035)}{(2947)(.077)} = .075$$

$$\frac{Dn}{b} = 0.16 \quad Dn = 3.2'$$

$$V = \frac{Q}{A} = \frac{485}{84.5} = 5.7\ fps$$

$$R = \frac{A}{P} = \frac{84.5}{34.3} = 2.46$$

R/W Req. 8' channel depth

$R/W = 24+16+20+16+24 = 100'$

~~use 100~~ ' Less 18' Rd use 85' } VO

R/W to be Req

$\overset{5}{20}' \times 1160 \times \frac{1}{43560} = \boxed{\overset{0.13}{\cancel{0.53}}\ A.C}$ } Void

Excavation 211+00 — 233+00 N. Morey Chan

$$Exc = \frac{(52+20)8}{2} \times 1 \times \frac{1}{27} \times 1{,}600$$

$= 17067$ use $\boxed{17{,}100\ C.Y}$

$.43\ C.Y/lf\ 1600 \times \frac{1}{43560} = \boxed{683\ C.Y}$

sht 19 of

10/21/80

LLAGAS CREEK – West Branch

Tg 238

Reach 13

1. Seeding (no seeding)

S. Channel d = 9' 211+00 — 230+00

Width = 55'

$60' \times 1900 \times \frac{1}{43560} = \boxed{2.6 \text{ Ac}}$

230+00 – 245+00

$55' \times 1500 \times \frac{1}{43560} = \boxed{1.9 \text{ Ac}}$

N Channel 217+00 – 233+00

$56 \times 1600 \times \frac{1}{43560} = \boxed{2.1 \text{ Ac}}$

Total area to be seeded = 6.6

2 Bridges

$66' \times 40' = 2640$ S.F

$61 \times 40 = 2440$ S.F

5080

3 Utilities

1975 Dollars 15000

@ 14%/yr. 1980 10500

25500

4 Site clearing

$72'\text{ave} \times 3400 \times \frac{1}{43560} = 5.6$ Ac

$72 \times 1600 \times \frac{1}{43560} = 2.6$ Ac

5 fencing 200'

6 R/W

Morey Channel

$32 \times 900 \times \frac{1}{43560} = .07$ Ac.

$67 \times 1500 \times \frac{1}{43560} = 2.3$

$\boxed{2.37 \text{ Ac}}$

N Morey channel (Dist has the R/W)

```
                                                                                          THIS RUN EXECUTED   4/17/81   16:20
*************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED JULY1979
  ERROR CORR -  01,02,03
  MODIFICATION -  50,51,52
*************************************************

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST
```

ALTERNATIVE F
STA 21+00 TO STA 245+00

```
REACH 13 MOREY CHANNEL
```

Final

```
SUMMARY PRINTOUT

     SECNO         Q       CWSEL      XLBEL       VCH       XLCH      CRIWS        EG      K*XNCH      ELMIN      DEPTH      STCHL      STCHR

  21100.000     420.00    209.48     210.11      1.61       0.00       0.00     209.52     35.00     202.11       7.37    9974.00  10038.00
  21200.000     420.00    209.50     210.29      1.67     100.00       0.00     209.54     35.00     202.29       7.21    9974.00  10038.00
  21300.000     420.00    209.53     210.47      1.74     100.00       0.00     209.57     35.00     202.47       7.06    9974.00  10038.00
  21400.000     420.00    209.55     210.65      1.80     100.00       0.00     209.60     35.00     202.65       6.90    9974.00  10038.00
  21500.000     420.00    209.57     210.83      1.86     100.00       0.00     209.62     35.00     202.83       6.74    9974.00  10038.00
  21600.000     420.00    209.59     211.01      1.92     100.00       0.00     209.65     35.00     203.01       6.58    9974.00  10038.00
  21700.000     420.00    209.62     211.19      1.99     100.00       0.00     209.68     35.00     203.19       6.43    9974.00  1003[illegible].00
  21800.000     420.00    209.65     211.37      2.05     100.00       0.00     209.72     35.00     203.37       6.28    9974.00  1003[illegible].00
  21900.000     420.00    209.68     211.55      2.12     100.00       0.00     209.75     35.00     203.55       6.13    9974.00  1003[illegible].00
  22000.000     420.00    209.72     211.73      2.19     100.00       0.00     209.79     35.00     203.73       5.99    9974.00  1003[illegible].00
  22100.000     420.00    209.76     211.91      2.27     100.00       0.00     209.84     35.00     203.91       5.85    9974.00  100[illegible].00
  22200.000     420.00    209.80     212.09      2.34     100.00       0.00     209.88     35.00     204.09       5.71    9974.00  100[illegible].00
  22200,000    420,00    209,80    212,[illegible]     2,34     100,00       0,00   209,8[illegible]    35,00    [illegible]04,09      5,71   9974,00        ,00
  22300,000    420,00    209,84    21                  2,42     100,00       0,00   209,9         35,00     204,27       5,57   9974,00 10   8,00
  22400,000    420,00    209,90    212,45              2,50     100,00       0,00   209,99        35,00     204,45       5,45   9974,00 100  8,00
  22500,000    420,00    209,95    212,63              2,58     100,00       0,00   210,05        35,00     204,63       5,32   9974,00 100  8,00
  22600,000    420,00    210,01    212,81              2,65     100,00       0,00   210,12        35,00     204,81       5,20   9974,00 100  8,00
  22700,000    420,00    210,08    212,99              2,73     100,00       0,00   210,20        35,00     204,99       5,09   9974,00 100  8,00
  22800,000    420,00    210,15    213,17              2,81     100,00       0,00   210,28        35,00     205,17       4,98   9974,00 100   ,00
  22900,000    420,00    210,23    213,35              2,89     100,00       0,00   210,36        35,00     205,35       4,88   9974,00 100   ,00
  22980,000    420,00    210,32    213,53              2,97     100,00       0,00   210,45        35,00     205,53       4,79   9974,00 100   ,00



     SECNO        Q       CWSEL     XLBEL       VCH      XLCH      CRIWS       EG      K*XNCH     ELMIN      DEPTH     STCHL     TCHR
  23000,000    200,00    210,44    210,33      1,62     20,00       0,00   210,48    35,00     205,53      4,91   9982,50 10017,50
  23100,000    200,00    210,42    210,93      1,94      1,00       0,00   210,48    35,00     206,13      4,29   9982,50 10017,50
  23200,000    200,00    210,40    211,53      2,41      1,00       0,00   210,49    35,00     206,73      3,67   9982,50 10017,50
  23300,000    200,00    210,35    212,13      3,11      1,00       0,00   210,50    35,00     207,33      3,02   9982,50 10017,50
  23400,000    200,00    210,23    212,73      4,39      1,00       0,00   210,53    35,00     207,93      2,30   9982,50 10017,50
  23500,000    200,00    210,16    213,33      6,69      1,00     210,16   210,85    35,00     208,53      1,63   9982,50 10017,50
  23600,000    200,00    210,76    213,93      6,68      1,00     210,76   211,45    35,00     209,13      1,63   9982,50 10017,50
  23700,000    200,00    211,36    214,53      6,68      1,00     211,36   212,05    35,00     209,73      1,63   9982,50 10017,50
  23800,000    200,00    211,96    215,13      6,68      1,00     211,96   212,65    35,00     210,33      1,63   9982,50 10017,50
  23900,000    200,00    212,56    215,73      6,68      1,00     212,56   213,25    35,00     210,93      1,63   9982,50 10017,50
  24000,000    200,00    213,16    216,33      6,68      1,00     213,16   213,85    35,00     211,53      1,63   9982,50 100   ,50
```

```
NOTE- ASTERISK (*) AT LEFT OF CROSS-SEC   N NUMBER  DICATES MESSAGE IN SUMMARY OF   RRORS LIST
```

ALTERNATIVE F

```
REACH 13 NORTH MOREY
```

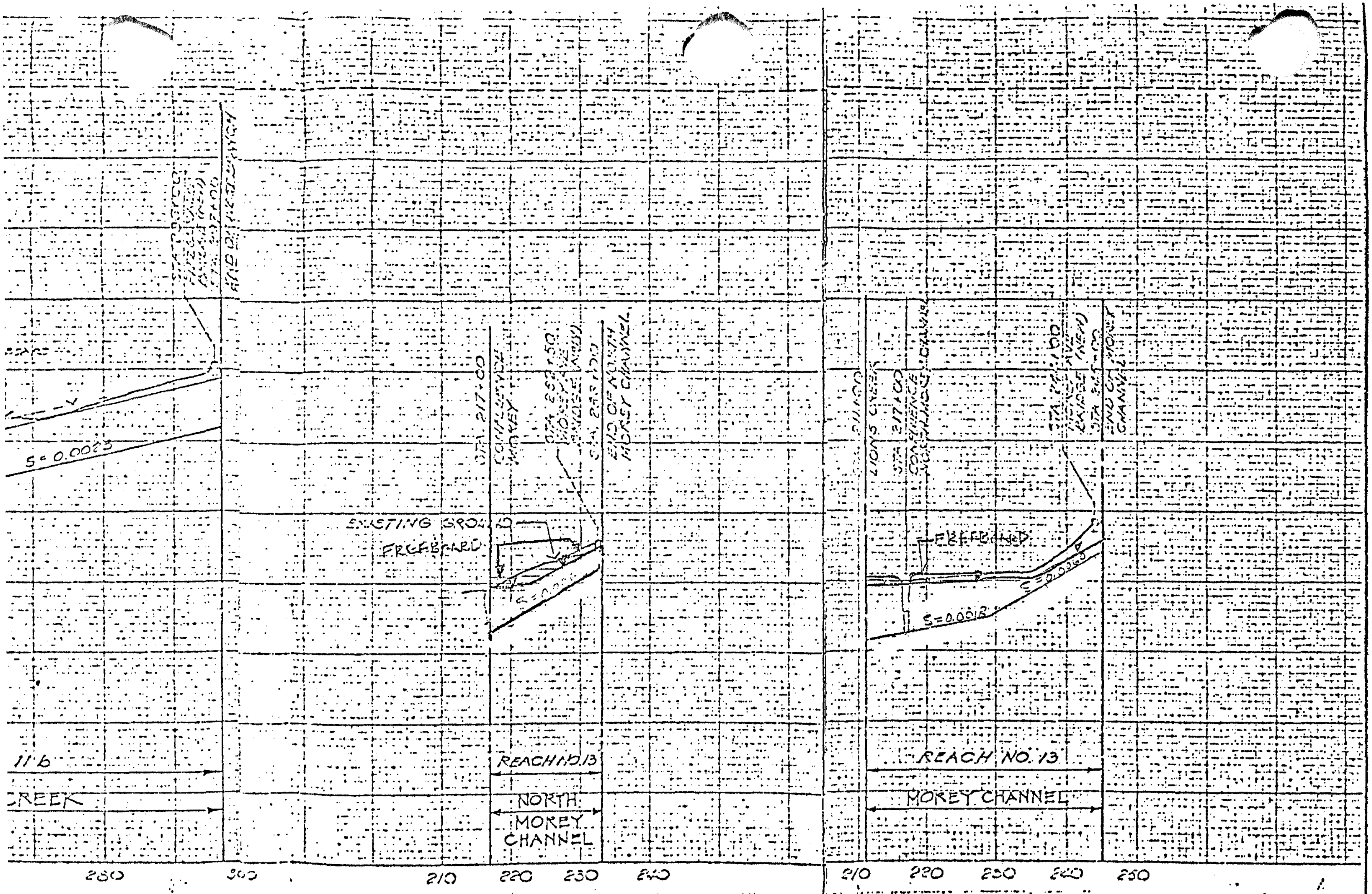
STA 217+00 To Sta 233+00

FINAL

```
SU   ARY PRINTOUT

     SECNO       Q        CWSEL     XLBEL      VCH      XLCH     CRIWS      EG     K*XNCH     ELMIN     DEPTH     STCHL     TCHR

   217.000    485.00    209.62    210.19     2.30      0.00      0.00    209.70    35.00    203.19      6.43   9976.00 100 4.00
   218.000    485.00    209.65    210.79     2.61    100.00      0.00    209.76    35.00    203.79      5.86   9976.00 100 4.00
   219.000    485.00    209.69    211.39     2.98    100.00      0.00    209.83    35.00    204.39      5.30   9976.00 100 4.00
   220.000    485.00    209.76    211.99     3.44    100.00      0.00    209.94    35.00    204.99      4.77   9976.00 10024.00
   221.000    485.00    209.87    212.59     3.97    100.00      0.00    210.11    35.00    205.59      4.28   9976.00 100 4.00
   222.000    485.00    210.04    213.19     4.57    100.00      0.00    210.36    35.00    206.19      3.85   9976.00 100 4.00
   223.000    485.00    210.30    213.79     5.11    100.00      0.00    210.71    35.00    206.79      3.51   9976.00 100 4.00
   224.000    485.00    210.69    214.39     5.53    100.00      0.00    211.16    35.00    207.39      3.30   9976.00 10024.00
   225.000    485.00    211.18    214.99     5.77    100.00      0.00    211.69    35.00    207.99      3.19   9976.00 10024.00
   226.000    485.00    211.73    215.59     5.87    100.00      0.00    212.27    35.00    208.59      3.14   9976.00 10024.00
   227.000    485.00    212.32    216.19     5.92    100.00      0.00    212.86    35.00    209.19      3.13   9976.00 10024.00
   228.000    485.00    212.92    216.79     5.92    100.00      0.00    213.46    35.00    209.79      3.13   9976.00 100 4.00
   229.000    485.00    213.52    217.39     5.90    100.00      0.00    214.06    35.00    210.39      3.13   9976.00 10024.00
   230.000    485.00    214.12    217.99     5.90    100.00      0.00    214.66    35.00    210.99      3.13   9976.00 10024.00
   231.000    485.00    214.71    218.59     5.92    100.00      0.00    215.26    35.00    211.59      3.12   9976.00 10024.00
   232.000    485.00    215.31    219.19     5.92    100.00      0.00    215.86    35.00    212.19      3.12   9976.00 10024.00
   232.340    485.00    215.33    219.39     6.38     34.00      0.00    215.96    15.00    212.39      2.93   9976.00 10024.00
   232.660    485.00    215.33    219.59     6.92     32.00      0.00    216.08    35.00    212.59      2.74   9976.00 10024.00
   233.000    485.00    215.75    219.79     6.33     34.00      0.00    216.37    35.00    212.79      2.96   9976.00 100 4.00
```



REVISED
4/20/81

LLAGAS CREEK

WORK PLAN

REVISED PROFILE

REACH No. 11a, 11b & 13

Calif Llagos EIS

LL Hansen 8/28/81

Narrative of EIS Back up Data Summaries

The following data was extracted from several sources

Plans A – F
1979 EIS
1979 Supplements for Upper & Lower Llagas
1981 Supplements for Upper & Lower Llagas
1980 Hydrology for Chesbro Dam Study

Alternate is based on the 1979 plan
Alternates B, C, & D are based on modifications of Alterate A
Alternate E & F are the same except Reach 11 B
is not included in F

Calif   Llagas EIS

LLH   8/28/81

Affected Reaches

Reach	Alternatives A	B	C	D	E	F
2	1/					
3						N
4					$\overline{G}$ 3/	$\overline{G}$
5					N 4/	N
6a	L 2/	L	L		G 6/	G
6b	L	L	N		N	N
7a						
7b						
8a	C 5/	C	C	C	C	C
8b						
9						
10						
11a						
11b						N
11c	N		N		N	N
12						
13						
14			N		N	N
15a			N		N	N
15b			N		N	N
15c	N		N		N	N
16			N		N	N
Dam	7/	N	N	N	N	N

1/ Trapizoidal Channel
2/ Leveed Flood Plain
3/ Clearing & Grubbing Reach 4 in Lower Llagas
4/ Not affected
5/ Concrete lined channel
6/ Clearing and Grubbing
7/ Chesbro Dam modification

Calc

Llagas EIS

LL Hansen 8/27/81

Channel Reaches & lengths

Reach			Round	What
2		2.23	2.2	2.3 ?
3		3.73	3.7	3.8 ?
4	L 1.50 U .76 }	2.26	2.3	2.1 ?
5		.45	.5	.4 ?
6a		3.65	3.7	~~2.3~~ 3.7
6b		.59 ✓ .54	~~.6~~ .5	.9 ?
7a		1.62	1.6	1.6
7b		.90	.9	1.0 ✓
8a		.97	1.0	1.0
8b		.61	.6	.6
9		3.20	3.2	3.2
10		.50	.5	.5
11a		.72	.7	.7
11b		1.46	1.5	1.5
11c		1.19?	1.2	1.2
12		1.70	1.7	1.7
13		.95	1.0	1.0
14		3.42	3.4	3.4
15a	0+00 45+20	= .86	.9	.8
15b	45+20 - 126+70	= 1.54	1.5	1.5
15c	126+70 -	.7	.7	.7
16	180+50 - 220+85	= .76	.8	.7 ?
			~~34.2~~ 34.1	~~32.9~~ 34.3

x 8b, 11b, 11c, 15a, b, c & 16 from 1979 supplement

COMPUTATION SHEET U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif Llagos EIS
BY LL Hansen 8/28/81 CHECKED BY DATE
SUBJECT Bridges & Culverts

A	38	25	DMJM 79
B	40	25	A + 11c + 15c
C	36	13	A - 6b - 14 - 15a - 15b - 15c - 16
D	40	25	same as B
E	20	16	F + 11b
F	19	16	F

Drop

ABCD from DMJM
EF from F

A	27	
B	28	A + 15c
C	21	Supple - 8b - 14, 15a, b, c, 16
D	28	same as B
E	11	F - 3 - 14 - 5 + 11b
F	10	F - 3 - 14 - 5

Fords 2 DMJM

DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Calif
LLH 8/27/81

Llagas EIS

Relocations Summary

	A	B	C	D	E	F
2	—			—	—	—
3	1	1	1	1	—	—
4	3	3	3	2	—	—
5	—	—		—	NA	NA
6a	—	—	—	—		—
6b	—	—	NA	—	NA	NA
7a	1	1	1	1	1	—
7b	2	2	2	2	2	1
8a	1	1	1	1	1	1
8b	—	—	—	—	—	—
9	—	—	—	—	—	—
10	—	—	—	—	—	—
11a	—	—	—	—	—	—
11b	—	—	—	—	—	NA
11c	NA	—	NA	—	NA	NA
12	—	—	—	—	—	—
13	—	—	—	—	—	—
14	1	1	NA	—	NA	NA
15a	—	—	NA	—	NA	NA
15b	—	—	NA	—	NA	NA
15c	NA	—	NA	—	NA	NA
16	—	—	NA	—	NA	NA
	9	9	8	7	4	2
EIS shows	9	7	5	5	2	2

Calif

Llagas EIS

LLH 8/28/81

R/W

	B	O	B O	B O	B O	B O	B O
Reach	A		B	C	D	E	F
2	3,9	49,2	3,9-49.2	3,9-49,2	3.9-27.8	3.9-49.2	3,9-49,2
3		30,1	– 30.1	-30.1	-17.0	30.1	N
4	16.5	41.6	16.5-41.6	16.5-41.6	16.5-22.3	16.5-33.8	18.3- 3.2
5		3,2	-3.2	-3.2	-1.5	N	N
6a	34.8	69.2	34.8-69.2	34.8-69.2	35-52.7	34.8-69.2	50.5-5.0
6b	4.2	18.5	4.2-18.5	N	4.2-15.6	N	N
7a		33.1	-33.1	-33.1	-33.1	1.1-23.9	– 16.1
7b	1.9	13.5	1.9-13.5	1.9-13.5	1.9-13.5	1.9-3.5	1.3-2.2
8a	1.2	3.8	1.2-3.8	1.2-3.8	1.2-3.8	1.2-4.5	1.2-1.1
8b	.5	6.9	.5-6.9	.5-6.9	.5-6.6	-1.7	-1.7
9	2,6	5.1	2.6-5.1	2,6-5.1	2.6-5.1	2,6-5.1	—
10		4.8	-4.8	-4.8	-4.8	-4.8	3.9
11a	1.3	6.2	1.3-6.2	1.3-6.2	1.3-6.2	1.3-6.2	1.3-6.2
11b	1.4	22,1	1.4-22.1	1,4-22.1	1.4-22.1	1.4-22.1	N
11c		N	.5 13.7	N	.5-13.7	N	N
12	2,4	7.2	2,4-7.2	2.4-7.2	2,4-7.2	2.4-7.2	– 2.8
13	1.0	5.7	1.0-5.7	1.0-5.7	1.0-5.7	1.0-5.7	1.0 2.4
14	5.1	93.8	5.1-93.8	N	5.1-62.5	N	N
15a	1.0	17.2	1.0-17.2	N	1.0-11.4	N	N
15b	1.6	27.8	1.6-27.8	N	1.6-21.3	N	N
15c		N	12.4	N	-12.4	N	N
16	1.3	11.6	1.3-11.6	N	1.3-9.1	N	N
Dam		—	N	N	N	N	N
Total	76.5	470.6	77.0 496.7	67.5-301.7	81.4-315.4	68.1-267.	77.3 93.8
Σ Total	547.1		573.7	369.2	396.8	335.1	171.1

COMPUTATION SHEET

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Calif Llagas EIS
LLHansen 8/27/81
Non structural

51 houses 8 business

Assumptions

8 business and 11 houses are of blockwall construction 700□'

40 houses on slabs with wood siding - 1225□'

From work on Lower Silver Creek Watershed

Block wall
Protect with waterproof paint @ $1000/structure

See Reach 3 "Hydra"

19(1000) = $19000

Houses
See attached worksheet

Cost = 40(4592) = 183,680

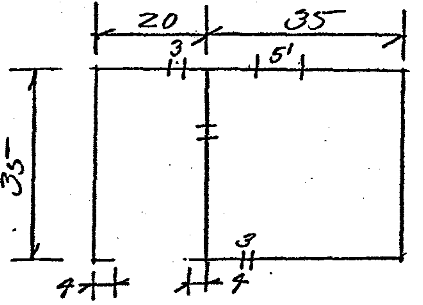
Σ Cost = 19000 + 183,680 = $202,680
Contengency 15% = 30,400
233,080
Adm, Engr insp. 20% = 46,600
279,680

round = $280,000

Cal.F Lower Silver Creek

LLH 5/27/80

Nonstructural
Slab
Wall Contiguous to house including garage



1225 □'

2' Wall

Wall length = 4(35)+20+2(4) − 2(3)−5 = 157'

1. Trench (hand) 157(.75)		117.75
2. Wall Treatment		
Material 157(2)(.25) =	78.50	
Labor 2 hr @ 9.00 =	18	
	96.50	96.50
3. Footing		
$1 \frac{ft^3/ft\,(157)}{27}(150)$		872.20
4. Wall		
Below ground		
$\frac{1.3(157)}{27}(150)$		377.95
Above ground		
$\frac{157}{1.3}(3)(.75)$ =	272	
Labor $\frac{157(3)}{8}\frac{20}{60}(29.81)$ =	585	
	857	857.00
5. Watershield		
Doors		
2 @ 150		
1 @ 300		
1 @ 500		1100.00
6. Move exterior plumbing		80
7. Landscape		220
8. One way Valve 2 @ 200		400
		4121

If siding add 157(3) = 471

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif

Llagas EIS

BY LLH 8/27/81

SUBJECT Channel Lengths

Reach	A	B	C	D	E	F
2	2.2	2.2	2.2	2.2	2.2	2.2
3	3.7	3.7	3.7	3.7	3.7	3.7
4	2.3	2.3	2.3	2.3	2.3	2.3
5	.5	.5	.5	.5	NA	NA
6a	3.7	3.7	3.7	3.7	3.7	3.7
6b	.5	.5	NA	.5	NA	NA
7a	1.6	1.6	1.6	1.6	1.6	1.6
7b	.9	.9	.9	.9	.9	.9
8a	1.0	1.0	1.0	1.0	1.0	1.0
8b	.6	.6	.6	.6	.6	.6
9	3.2	3.2	3.2	3.2	3.2	3.2
10	.5	.5	.5	.5	.5	.5
11a	.7	.7	.7	.7	.7	.7
11b	1.5	1.5	1.5	1.5	1.5	NA
11c	NA	1.2	NA	1.2	NA	NA
12	1.7	1.7	1.7	1.7	1.7	1.7
13	1.0	1.0	1.0	1.0	1.0	1.0
14	3.4	3.4	NA	3.4	NA	NA
15a	.9	.9	NA	.9	NA	NA
15b	1.5	1.5	NA	1.5	NA	NA
15c	.7	.7	NA	.7	NA	NA
16	.8	.8	NA	.8	NA	NA
Chestro Dam		NA	NA	NA	NA	NA
Total length	32.9	34.1	25.1	34.1	24.6	23.1
Trap Ch.	23.6	24.8	15.8	29.0	14.3	12.8

Conc. Ch 1.0 (8a) = 1.0 miles

New + .5(10) + 1.6(12) + .6 (13) + 1.4(7a) = 4.1 miles

Levees 3.7 (6a) + .5(6b) = 4.2 miles

Grub 1.5(5) + 3.7(6a) = 5.2 miles

Calif
LLH 8/28/81

Llagas Supplement

Alternatives	Cost
A 1/	61,992,000
B 1/	63,017,400
C 1/	51,954,700
D 1/	50,377,700
E 1/	27,399,400
F 2/	5,009,200 16,089,900 = 21,099,100

1/ from summary of Cost + Benefits
Cost finalized by Cocke

2/ Hansen (Supplement)